

Nine federally listed endangered species and five species globally or locally threatened have been recorded in KTA or its vicinity (R.M. Towill Corp. 1997b). These species are listed on Table 7-21 and are described further below. This includes eight invertebrates, five birds, and an endangered terrestrial mammal (USARHAW and 25th ID[L] 2001a).

### ***Sensitive Habitats***

#### ***Critical Habitat***

There are 681 acres of designated plant critical habitat within the KTA/KLOA ROI but there is no designated critical habitat on the Army installations. The plants for which critical habitat has been designated on KTA are listed in Appendix I-1d and are shown in Figure 7-24. There are 4,812 acres of critical habitat for the 'elepaio in the KTA/KLOA ROI (see Figure 7-25).

#### ***Ecologically Sensitive Areas***

There are two areas on KTA that have been determined by elevation, topography, and prevailing ecological conditions to be ecologically sensitive. They contain vegetation communities that are considered rare or threatened.

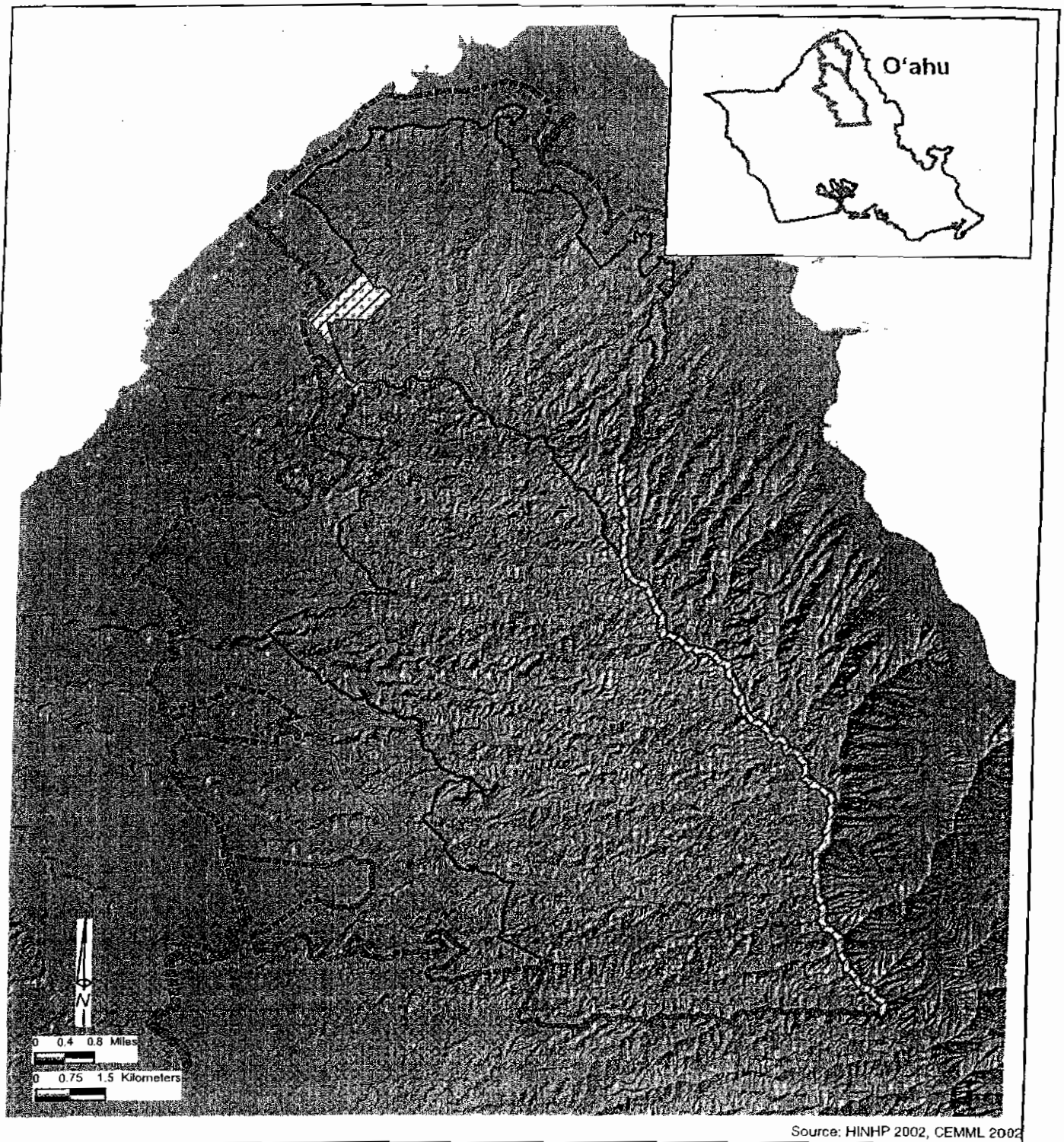
The wet summit crest zone is considered sensitive and exists in areas above 1,640 feet (500 meters), along the northern Ko'olau summit. The relatively gentle ridges are cut by steep-sided gulches in this cool, wet cloud-swept region. The vegetation community in this part of the ROI is almost exclusively 'ōhi'a lowland wet shrubland; this community is not considered rare and has a Global Heritage ranking of G3. Loulu hiwa lowland wet forest had been labeled a rare natural community (Global Heritage ranking of G1) and occurs in one steep-sided drainage area within the ROI. An additional rare natural community known in this area is 'ōhi'a mixed montane bog, which has a Global Heritage ranking of G1.

The second sensitive area is the lowland forest zone. It exists from ridge tops to gulch bottoms at elevations of 590 to 2,200 feet (180 to 671 meters). This area is generally less windy, with conditions being warmer, and moisture ranging from moist to wet as rainfall diminishes increasingly with distance from the summit. 'Ōhi'a lowland wet forests are present in higher elevations, with gradation to koa/'ōhi'a lowland moist forest. Adjacent areas are generally a mosaic of moist forest types, with somewhat diverse canopy constituents, though they are generally dominated by 'ōhi'a. The drier zones are moist to dry shrublands dominated by *Dodonea viscosa* ('a'ali'i). The steeper slopes at this elevation are dominated by uluhe (*Dirranopteris*) lowland wet shrubland. These natural communities represent relatively widespread vegetation types that occur on most of the main islands; none are considered rare (Global Heritage rankings of G3 and G4).

There is one aquatic natural community (Mālaekahana Stream) on KTA with a vegetation community rank of G4.



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Source: HINHP 2002, CEMML 2002

There are 681 acres of federally designated plant critical habitat occurring in the Kahuku/Kawaiioa Training Areas Region of Influence.

# **Federally Designated Plant Critical Habitat in the Kahuku/Kawaiioa Training Areas Biological Region of Influence**

- Legend**
- Drum Road
  - Installation Boundaries
  - Region of Influence
  - Federally Designated Plant Critical Habitat
  - Roads

O'ahu, Hawai'i

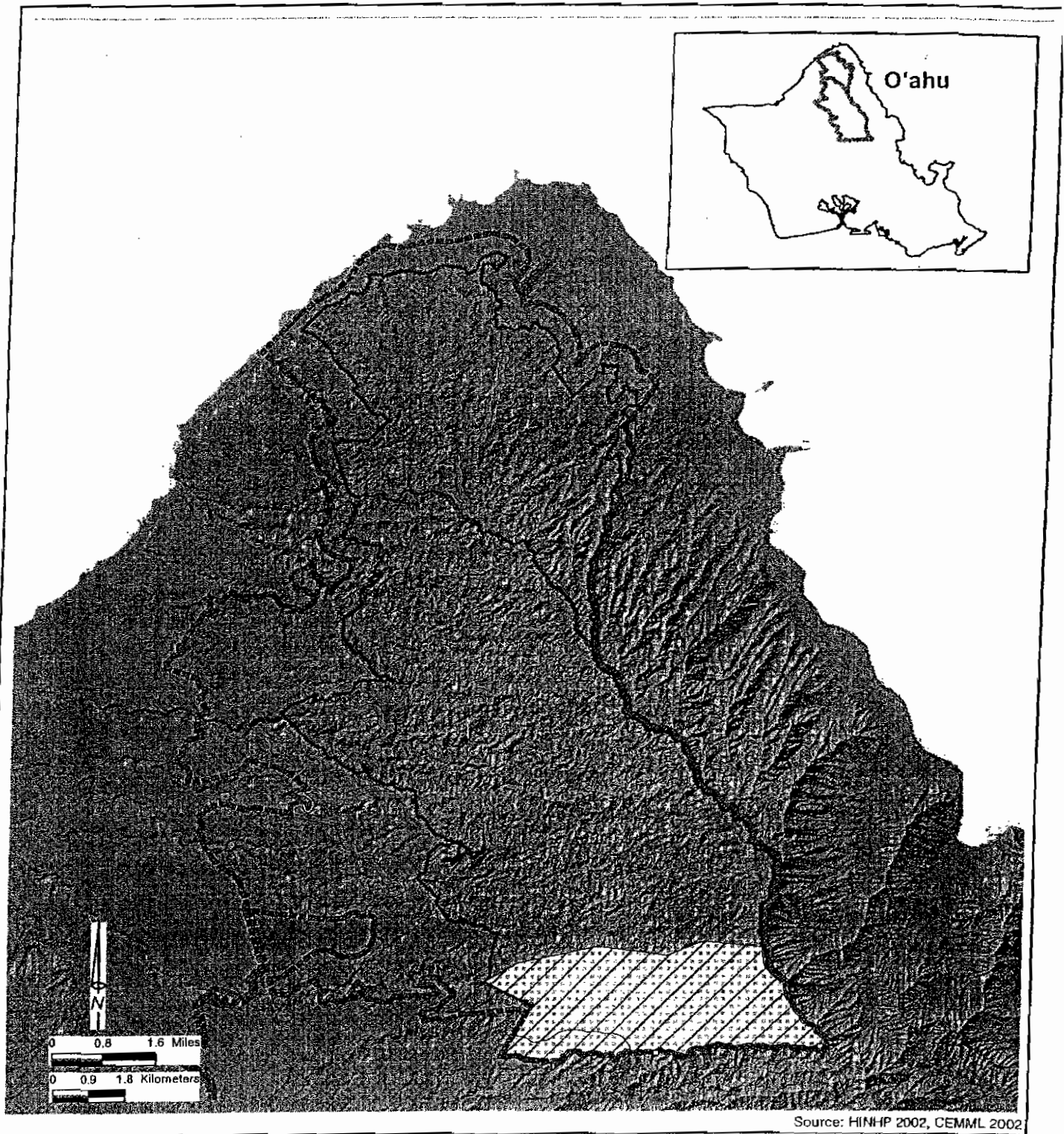
**Figure 7-24**

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Source: HINHP 2002, CEMML 2002

The are 4,812 acres of elepaio critical habitat occurring with in the Kahuku/Kawailoa Training Areas Region of Influence.

#### Legend

- Drum Road
- Installation Boundaries
- Region of Influence
- Elepaio Critical Habitat
- Roads

## Federally Designated Critical Habitat for the O'ahu 'Elepaio at the Kahuku/Kawailoa Training Areas Biological Region of Influence

O'ahu, Hawaii  
Figure 7-25

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Biologically Significant Areas

The Hawai'i Natural Heritage Program has defined three types of BSAs for managing important natural communities. All are found in the KTA/KLOA ROI and are shown in Figure 7-26.

BSA1: Contains a high density of federally listed endangered, proposed endangered, or candidate species.

Approximately 1,000 acres (405 hectares) of the KTA/KLOA ROI in KLOA are designated as BSA1. This includes much of the wet summit crest ecological zone and the two rare natural communities. Twenty-six of the 28 endangered plant species at KLOA are in this area.

BSA2 contains all or some of the following: lower densities of current occurrences of federally listed endangered or proposed endangered species, current occurrences of candidate species or other species of concern that are expected to be upgraded to federal protected status within the next few years, and areas judged likely to contain high densities of federally listed species based on habitat assessment, despite the lack of any record of such occurrence to date.

There are five BSA2 areas in KTA, three of which are in the northern portion of the training area and contain populations of *Eugenia koolauensis*. At the southern tip of KTA is a BSA2 that includes in its vegetative community populations of the federally listed as endangered *Gardenia mannii*, *Cyanea koolauensis*, and *Hesperomannia arborescens*. In the northwest of KTA is an additional BSA2 that harbors the endangered tree *Tetraplasandra gymnocarpa*, as well as *Gardenia mannii*. An additional BSA2 zone within the ROI is composed mostly of potential habitat for the endangered land snail, *Achatinella*. This area covers all the remaining wet summit crest zone that was not included in BSA1. These endangered plant species are known to occur in this region: *Eugenia koolauensis*, *Cyanea longiflora*, *Delisea subcordata*, *Gardenia mannii*, *Phlegmariurus nutans*, *Melicope hygatei*, *Myrsine juddii*, *Phyllostegia hirsute*, and *Viola oahuensis*.

BSA3 is stands of intact native vegetation with few or no known occurrences of rare elements.

KTA's BSA3 area is large and continuous and adjoins all but one of the BSA2 areas. The dominant vegetation types are 'ohi'a lowland wet forest and uluhe lowland wet shrubland, which are potential habitats for endangered tree snails and native forest birds. As of 1997, seven plants in the BSA3 region were upgraded to federal status, and it is possible that boundary areas have been revised. Although there are no rare communities in the BSA3, the forests in these locations are native dominated and provide potential habitat for species reintroduction.



Also found within the ROI is sensitive snail habitat. Although this habitat has not been federally designated or proposed as critical habitat, it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on O'ahu. This area is shown with the BSAs in Figure 7-26.

#### 7.10.2 Environmental Consequences

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and a reanalysis of the available information, we recognize that the impact on biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

##### **Summary of Impacts**

Biological resources that have been considered include vegetation communities, wildlife, sensitive species, and sensitive habitats. Significant impacts include impacts from fire on sensitive species and habitat at KTA but these impacts are mitigable at KLOA. Construction of facilities and training activities including the use of the Drum Road and the impacts from nonnative species will have a significant but mitigable to less than significant impact on sensitive species and sensitive in the ROI. Less than significant impacts are expected on general habitat and wildlife from construction and training, on migratory birds from construction of FTT antennas and UAV use, and on wildlife from noise and visual impacts of project activities.

All biological resources have been assessed for potential impacts from project activities. For a full description of the impact methodology used to determine impact to a resource please refer to Section 4.10. Only the resources potentially affected are included in this chapter. If a resource was determined not to be impacted, it has not been included for discussion. A summary of impacts is provided in Table 7-22.

##### **Proposed Action (Preferred Alternative)**

##### Significant Impacts

Impact 1: Impacts from fire on sensitive species and sensitive habitat. SBCT activities within the KTA/KLOA ROI would increase the likelihood of wildland fire. This impact would be significant at KTA and significant and mitigable to less than significant at KLOA. At KTA, training would include use of certain pyrotechnics and SRTA ammunition, which is technically classified as live-fire ammunition and carries an increased threat of fire. There is less of a potential for fire at KLOA as training is limited to nonlive fire and consists mostly of dismounted maneuvers. There are direct and indirect ways in which fires would adversely affect sensitive species and habitat.

Sources of fire include cigarettes, vehicles, pyrotechnics, and nonlive fire training. Cigarettes discarded during mounted and dismounted training would be a risk with the increase in Soldiers and training at KTA and KLOA. Use of the roads by military vehicles would increase with the proposed renovation and construction. An increase in the traffic flow from Drum Road would increase the potential for fire that could affect sensitive species.

Specifically, the proposed Drum Road alignment traverses lowland wet and lowland moist forests and shrublands in KTA. Lastly, the increase in intensity in training, including the proposed SRTA live-fire training at KTA, would increase the probability that fire could originate in the ROI. The increased likelihood of wildfires and the potential SBCT risk factors are discussed in more detail in Section 7.12.2.

**Table 7-22**  
**Summary of Potential Biological Impacts at KTA/KLOA**

Impact Issues	Proposed Action	Reduced Land Acquisition	No Action
Impacts from fire on sensitive species and sensitive habitat	⊗/⊗	⊗/⊗	⊗/⊗
Impacts from construction and training activities on sensitive species and sensitive habitat.	⊖	⊖	⊖
Impacts from the spread of nonnative species on sensitive species and sensitive habitat.	⊖	⊖	⊖
Impacts from construction and training on general vegetation, wildlife, and habitat.	⊙	⊙	⊙
Threat to migratory birds	⊙	⊙	⊙
Noise and visual impacts.	⊙	⊙	⊙
Runoff impacts on marine wildlife and coral ecosystems.	○	○	N/A

LEGEND:

- |  |     |                     |
|--|-----|---------------------|
| ⊗ = Significant  | +   | = Beneficial impact |
| ⊖ = Significant but mitigable to less than significant | N/A | = Not applicable    |
| ◐ = Less than significant                              |     |                     |
| ○ = No impact  |     |                     |

Because natural sources of fire ignition are relatively rare in Hawai'i, many native Hawaiian plants are not adapted to fire and are adversely affected by it. Nonnative species, particularly nonnative grasses and shrubs, typically invade areas after they have burned. This inhibits the regeneration of native plants. The removal of native species and the spread of nonnative species are potential impacts associated with wildland fires and is discussed under Impact 3. In general, most fires in Hawai'i are caused by humans and are fueled primarily by nonindigenous grasses. If native species withstand an initial fire, they are often destroyed by later fires influenced by the invasion of highly flammable grasses. The potential spread of nonnative species resulting from wildfires is considered a significant impact because nonnative species often out-compete native species and destroy native communities. Wildfires that burn into native communities or sensitive habitats could take listed animal species and destroy listed plant species and sensitive habitats. There is no assurance that fires or other threats associated with the Proposed Action would not reach or otherwise threaten populations of listed species on KTA.

Vegetation communities within the ROI include the following:

- Nonnative vegetation communities (approximately 7,534 acres [3,049 hectares]);
- Lowland mesic forest and shrubland (approximately 379 acres [153 hectares]); and
- Lowland wet forest and shrubland (approximately 1,496 acres [605 hectares]).

The rare plants found in these communities are *Chamaesyce rockii*, *Cyanea acuminata*, *C. crispata*, *C. humboldtiana*, *C. koolauensis*, *C. lanceolata*, *C. st-johnii*, *Cyrtandra dentata*, *C. viridiflora*, *Doodia lyonii*, *Eugenia koolauensis*, *Exocarpus gaudichaudii*, *Gardenia mannii*, *Hedyotis fluvialis*, *Hesperomannia arborescens*, *Hibiscus kokio* ssp. *kokio*, *Joinvillea ascendens* ssp. *ascendens*, *Lobelia gaudichaudii* ssp. *koolauensis*, *L. hypoleuca*, *Melicope hiiakae*, *M. lydgatei*, *Myrsine forbergii*, *M. juddii*, *Nesoluma polynesianum*, *Phlegmariurus nutans*, *Phyllostegia hirsuta*, *Platydesma cornuta* var. *cornuta*, *Psychotria hexandra* ssp. *oahuensis*, *Pterahydia macrocarpa*, *Pteris lidgatei*, *Sanicula purpurea*, *Stenogyne kaakae* ssp. *sherffii*, *Tertaplasandra gymnocarpa*, *Thelypteris boydii*, *Viola oahuensis*, and *Zanthoxylum oahuensis*. There are areas of highly flammable nonnative plants (such as *Andropogon virginicus*) along the lower boundaries of areas dominated by native plants (R. M. Towill Corp. 1997b, 6-27; USARHAW and 25th ID[LJ 2001a, 290). BSAs that occur within the ROI and that could be affected by a wildfire are BSA2, at 214 acres (87 hectares), and BSA3, at 2,747 acres (1,112 hectares). The rugged terrain can limit the suppression and control of fires, and they can easily spread unchecked into areas that contain sensitive species.

Fires started as a result of any of these SBCT-proposed actions could adversely affect sensitive wildlife by killing them directly or indirectly by destroying their habitat. The sensitive wildlife species listed in Table 7-22 as potential or confirmed in the ROI could be affected by a wildfire, depending on its extent and duration.

In conclusion, sensitive species and habitat occurring within the ROI would be significantly affected by the likely increase in fires that would result from the Proposed Action. Although most sensitive species and sensitive habitats found on KTA and KLOA occur at high elevations, where fire vulnerability is relatively low because of higher levels of rainfall and less fire-prone vegetation, these areas are still considered at risk from fire. The outbreak of fire in portions of the ROI where sensitive species and habitat exist would be a significant impact that would be substantially lessened by regulatory and administrative mitigation, but would still be considered significant.

Regulatory and Administrative Mitigation 1. The effects of the Proposed Action on listed species in the ROI have been evaluated in the ESA Section 7 Consultation with USFWS. The Army will implement all the terms and conditions defined in the Biological Opinions issued by USFWS for current force and SBCT Proposed Actions on O'ahu and Hawai'i. The terms and conditions that implement the reasonable and prudent measures determined during this consultation will be incorporated into the Proposed Action. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementing the Proposed Action. The Biological Opinions are available upon request.

The IWEMP for Pōhakoloa and O'ahu Training Areas was updated in October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts from wildland fires. The plan is available upon request.

Additional Mitigation 1. No additional mitigation has been identified for this impact.

Significant but Mitigable to Less than Significant Impacts

Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat. Loss and degradation of sensitive species and sensitive habitat would result from project activities and construction in the KTA/KLOA ROI, specifically in the KTA portion. The use of Drum Road as part of SBCT actions would adversely affect the environment by increasing the amount and intensity of traffic in the KTA/KLOA ROI. Though much of the area surrounding Drum Road is already dominated by nonnative plants, the roads bring humans closer to biologically sensitive areas that exist in the ROI (Section 7.10.1, Figure 7-26). Sections of Drum Road cross biologically sensitive areas, with stands of intact native vegetation. Part of the reason that these communities still exist is due to their remoteness. Opening this area up to the more direct effects of humans threatens these communities and their diversity. Hawaiian plant communities evolved without the environmental pressures that are prevalent on major land masses and thus have no defense mechanisms to cope with these stresses. By fragmenting these sensitive communities, corridors for natural species dispersal are interrupted, nonnative plants are encouraged to spread, and the potential for native species to be reintroduced to areas dominated by nonnative species is limited. Troop and other foot traffic in or adjacent to native forest areas could harm rare natural communities, plants, and snails (R. M. Towill Corp. 1997b). Dozens of federally listed and sensitive species are known to occur or have the potential to occur within the KTA/KLOA ROI (Figures 7-22 and 7-23). This includes thirty-six plants, O'ahu creeper, Hawaiian hoary bat, and O'ahu tree snails (Tables 7-20 and 7-21). There is also plant critical habitat and 'elepaio critical habitat within the KTA/KLOA ROI (Figures 7-24 and 7-25), which could be negatively affected by training. *Tetraplasandra gymnocarpa*, a federally listed plant species was identified approximately 492 feet (150 meters) down a slope from Drum Road. This individual is unlikely to be affected directly by use of Drum Road but would be threatened by trampling if people were allowed to move off the proposed road or if a fire started as a result of vehicle use or a discarded cigarette. Because the slope is very steep, the likelihood of dismounted maneuver occurring along this portion of Drum Road is extremely small.

Increased use of Drum Road would result in direct and indirect impacts to sensitive species and habitat. The present trail is a rutted dirt road that sees little activity. The use of an upgraded Drum Road would fragment habitat for general and sensitive wildlife, ultimately reducing the quantity and quality of habitable lands. The presence of large loud vehicles would limit wildlife migration and would interrupt corridors for natural dispersal of species among these areas. Dust, soil erosion, and runoff would continue to adversely affect the areas that surround the road, including valuable freshwater resources. The loss in habitat value occurs primarily in those areas surrounding the trail, which are exposed to increased noise, car fumes, general activity, and invasive species, and areas downstream that are subject to runoff and erosion problems.



### Known Prehistoric and Historic Resources

#### Kahuku Training Area

Table 7-23 provides an overview of prehistoric and historic resources identified with the ROI and their NRHP status if known. One hundred archaeological sites have been identified at KTA, including prehistoric, historic, and military era sites. These include a heiau listed on the NRHP and a hearth, dwelling, and agricultural sites. Historic sites include a house, irrigation features, and bunkers. The 'Ōpana Mobile Radar Station is a National Historic Landmark listed in the NRHP. Only the heiau and the radar station have been evaluated for eligibility. Table 7-24 lists currently identified archaeological sites at KTA.

**Table 7-23**  
**Summary of Known Cultural Resources at KTA**

	Total Archaeological Sites	Sites Listed, Eligible for Listing, or Needing DE	Area Surveyed for Archaeological Sites	Cold War Era Buildings	Buildings Listed, Eligible for Listing, or Needing DE
KTA	100	36 (34 DE)	33%	22	22
Drum Road	23	23	27 miles <sup>1</sup> (43.5 kilometers)	0	0

Sources: IARII 2003; Pacific Legacy 2002; GANDA 2003c; SCS 2003.

<sup>1</sup>Fifteen meters on each side of 27 miles (43.5 kilometers) of road

DE – Determination of Eligibility.

Cold War-era buildings or structures at KTA are listed in Table 7-25. These sites are composed of the former Nike missile security facility and launch sites. The missile site at KTA was one of four Nike missile sites in Hawai'i and was active from January 1961 to March 1970. The buildings and structures are intact and are generally unaltered. The launcher area, administration area, and the control area all retain not only the original structures, but also many of the site features, such as security fencing, sidewalks, exterior stairs with metal railings, streets and curbing, flagpoles, bicycle wash/storage area, and electrical and plumbing equipment. The setting appears to be unaltered, other than the change in landscaping due to the abandonment of the site. Preserving this site was a stipulation of the Section 106 consultation on the demolition of the Nike site at DMR.

The Nike site is significant as an intact example of a Cold War Nike missile site and reflects an important development in the history of American civil air defense and as part of the Hawai'i Nike missile program. The site is eligible for the National Register under criterion A, having been associated with events that have made a significant contribution to the broad patterns of our history, and under criterion C, as it is a relatively unaltered and intact example of Nike missile site construction (IARII 2002a).

Table 7-24  
Archaeological Sites at KTA

Site Number	Site Type	Site Description
50-80-02-0259	Spring	Waikane Stone
50-80-02-0260	Heiau	Pu'uala Heiau (4,930 terrace facing)
50-80-02-0599	Bunkers	Three bunkers at Punamanō Communication Station
50-80-02-1043	Complex	Kawela agricultural terraces
50-80-02-2357	Wall	Plantation era stone wall remnant
50-80-02-2358	Single feature	House site 13m x 10m
50-80-02-2359	Two adjacent terraces	Terraces 22.5m x 6m
50-80-02-2360	Single feature	Terrace 20m x 10m
50-80-02-2501	Heiau	Hanakaoe platform 4m x 7m
50-80-02-4882	Bunker	Military bunker 8.7m x 4.5m
50-80-02-4883	Historic house site	Plantation era house site
50-80-02-4884	Imu	Imu site 3m
50-80-02-4885	Heiau	Pahipahi'ālua Heiau 17m x 12m
50-80-02-4886	Bunker	Pentagonal military bunker 3.5m x 3m
50-80-02-4887	Terrace complex	Habitation complex with related agricultural features 24m x 14m
50-80-02-4888	Wall/depressions	Agricultural earthen depressions/rock alignment 20m?
50-80-02-4930	Linear mound	Linear rock mound (remnants Site 260?) 7m x 2m
50-80-02-5534	Rock shelter	Temporary shelter 5m x 2.5m
50-80-02-5536	Rock shelter	Temporary shelter? 15m x 3m
50-80-02-5537	Enclosure	Enclosure (pre-Contact) 62m x 40m
50-80-02-5538	Wall	Wall (pre-Contact) 15m x 1m



Table 7-24  
Archaeological Sites at KTA (continued)

Site Number	Site Type	Site Description
50-80-02-5539	Terraces	Retaining wall and stone concentration 40m x 20m
50-80-02-5540	Terraces	Terraces 15m x 15m
50-80-02-5684	Enclosure	Enclosure 50m x 25m
50-80-02-5685	Rock shelter	Temporary shelter 9m x 5m
50-80-02-5686	Ahupua'a boundary	Wall 4m x 1m
50-80-02-5688	Roadway	Historic roadway 30m x 6m
50-80-02-5689	Bunker	Underground bunker 3m x 2m
50-80-02-5690	Enclosure	Bunker 4m x 3m
50-80-02-9506	Historic irrigation	Kea'aulu Ditch (hist. stone faced irr. ditch)
50-80-02-9507	Historic (?) terrace	'O'io Stream terrace (ag. terrace)
50-80-02-9508	Platform	East 'O'io Gulch platform (stepped stone platform)
50-80-02-9509	Complex	'O'io Gulch complex (agricultural terraces)
50-80-02-9517	Terraces	Kāneali'i agricultural terraces (possible remnants)
50-80-02-9745	Landmark	'Opana Mobile Radar Site
<u>SCS Temp# 1</u>	<u>Military</u>	<u>Fox holes</u>
<u>SCS Temp# 2</u>	<u>Military</u>	<u>Fox holes with rock wall</u>
<u>SCS Temp# 3</u>	<u>Military</u>	<u>Leveled area behind outcrop</u>
<u>SCS Temp# 16</u>	<u>Military</u>	<u>Rock terrace</u>
<u>SCS Temp# 19</u>	<u>Military</u>	<u>Concrete structure</u>
<u>SCS Temp# 30</u>	<u>Military</u>	<u>Bunker</u>
<u>SCS Temp# 36</u>	<u>Military</u>	<u>Concrete slab</u>
<u>SCS Temp# 38</u>	<u>Military</u>	<u>Concrete slab</u>
<u>SCS Temp# 39</u>	<u>Military</u>	<u>Concrete blocks</u>
<u>SCS Temp# 40</u>	<u>Military</u>	<u>Concrete slabs</u>
<u>SCS Temp# 41</u>	<u>Military</u>	<u>Concrete slab</u>
<u>SCS Temp# 42</u>	<u>Military training</u>	<u>Fire pit with trash</u>
<u>SCS Temp# 43</u>	<u>Military</u>	<u>Concrete slabs</u>
<u>SCS Temp# 44</u>	<u>Military</u>	<u>Concrete Slab with metal tank</u>
<u>SCS Temp# 45</u>	<u>Military</u>	<u>Concrete slab</u>
<u>SCS Temp# 47</u>	<u>Military</u>	<u>Concrete slabs</u>
<u>SCS Temp# 48</u>	<u>Military</u>	<u>Foundations with bottle glass</u>
<u>SCS Temp# 49</u>	<u>Military</u>	<u>Concrete drainage</u>
<u>SCS Temp# 53</u>	<u>Military training</u>	<u>Collapsed concrete box</u>
<u>SCS Temp# 54</u>	<u>Military training</u>	<u>Intact concrete box</u>
<u>SCS Temp# 56</u>	<u>Military training</u>	<u>Fire pit with metal fragments and other trash</u>
<u>SCS Temp# 60</u>	<u>Military</u>	<u>Two fire pits with trash</u>

Table 7-24  
Archaeological Sites at KTA (continued)

Site Number	Site Type	Site Description
<u>SCS Temp# 4</u>	<u>Plantation/Agriculture possible</u>	<u>Boulder concentration</u>
<u>SCS Temp# 10</u>	<u>Unknown</u>	<u>Rectangular boulder platform</u>
<u>SCS Temp# 11</u>	<u>Unknown/stabilization</u>	<u>Terrace down slope of a level area</u>
<u>SCS Temp# 12</u>	<u>Pre-military</u>	<u>Multiple features, including mounds and fox holes</u>
<u>SCS Temp# 13</u>	<u>Historic</u>	<u>Linear terrace</u>
<u>SCS Temp# 20</u>	<u>Historic</u>	<u>Terrace and a road</u>
<u>SCS Temp# 21</u>	<u>Historic</u>	<u>Rock mound</u>
<u>SCS Temp# 22</u>	<u>Historic</u>	<u>Rock mound</u>
<u>SCS Temp# 24</u>	<u>Historic</u>	<u>Boulder concentration</u>
<u>SCS Temp# 25</u>	<u>Historic</u>	<u>Two linear boulder concentrations</u>
<u>SCS Temp# 26</u>	<u>Historic</u>	<u>Rock mound</u>
<u>SCS Temp# 32</u>	<u>Historic</u>	<u>Cobble and boulder terrace</u>
<u>SCS Temp# 33</u>	<u>Historic</u>	<u>Rock mound</u>
<u>SCS Temp# 50</u>	<u>Historic</u>	<u>Linear boulder concentration</u>
<u>SCS Temp# 52</u>	<u>Historic</u>	<u>Boulder and cobble piles</u>
<u>SCS Temp# 55</u>	<u>Historic</u>	<u>Linear boulder concentration</u>
<u>SCS Temp# 57</u>	<u>Historic</u>	<u>Boulder mound and terrace</u>
<u>SCS Temp# 61</u>	<u>Historic</u>	<u>Rock mound and depression</u>
<u>SCS Temp# 63</u>	<u>Historic</u>	<u>Rock mound</u>
<u>SCS Temp# 64</u>	<u>Historic</u>	<u>Multiple rock mounds</u>
<u>SCS Temp# 5</u>	<u>Undetermined</u>	<u>Paved terrace and rock mounds</u>
<u>SCS Temp# 6</u>	<u>Undetermined</u>	<u>Terrace</u>
<u>SCS Temp# 7</u>	<u>Prehistoric</u>	<u>Enclosure and mounds</u>
<u>SCS Temp# 8</u>	<u>Undetermined</u>	<u>Mounds with glass bottles</u>
<u>SCS Temp# 9</u>	<u>Undetermined</u>	<u>Enclosure with entryway</u>
<u>SCS Temp# 14</u>	<u>Prehistoric</u>	<u>Rock mound</u>
<u>SCS Temp# 15</u>	<u>Prehistoric/Historic</u>	<u>Rock concentration</u>
<u>SCS Temp# 17</u>	<u>Undetermined</u>	<u>Modified outcrop, rock mounds</u>
<u>SCS Temp# 18</u>	<u>Agriculture/undetermined</u>	<u>Linear rock mound</u>
<u>SCS Temp# 29</u>	<u>Traditional</u>	<u>Two fire pits</u>
<u>SCS Temp# 34</u>	<u>Undetermined</u>	<u>Wall with sub-features</u>
<u>SCS Temp# 46</u>	<u>Undetermined</u>	<u>Large retaining terrace</u>
<u>SCS Temp# 51</u>	<u>Undetermined</u>	<u>Terraces and rock mounds</u>
<u>SCS Temp# 58</u>	<u>Prehistoric</u>	<u>Lithic scatter</u>
<u>SCS Temp# 59</u>	<u>Prehistoric</u>	<u>Rock mound, possible trail marker</u>
<u>SCS Temp# 65</u>	<u>Traditional</u>	<u>Fire pit</u>

Source: IARI 2003; GANDA 2003c; SCS 2003.



Table 7-25  
Historic Military Buildings at KTA

Facility No.	Description (original use)	Year Built	Historical Period
0001	Administrative building	1961	Cold War
0003	Flagpole (gone)	1961	Cold War
0004	Pump house (water supply/treatment building)	1961	Cold War
0005	Barracks and mess hall	1961	Cold War
0008	Water storage tank	1961	Cold War
0009	Water supply/treatment building; pump house	1961	Cold War
0013	Control station; air/fallout shelter	1961	Cold War
0014	Control station; air/fallout shelter	1961	Cold War
0018	Control station; air/fallout shelter	1961	Cold War
00020	Sentry box	1961	Cold War
0022	Protective barrier	1961	Cold War
0023	Protective barrier	1961	Cold War
0026	Protective barrier	1961	Cold War
0027	Protective barrier	1961	Cold War
0028	Sentry control station	1961	Cold War
0030	Protective barrier	1961	Cold War
0036	Protective barrier	1961	Cold War
0037	Warhead building	1961	Cold War
0045	Missile assembly and test building	1961	Cold War
0047	Generator building	1961	Cold War
0048	Transformer building	1955	Cold War
0060	Sentry box	1961	Cold War
0061	ACQ tower (gone)		Cold War
0063	Administration building	1961	Cold War
0064	Flagpole	1961	Cold War
0067	Barracks and mess hall	1961	Cold War
0070	Generator building	1961, 1963	Cold War
0071	Transformer pad	1963	Cold War
0075	MTR & TTR pad	1963	Cold War
0078	MTR & TTR pad	1963	Cold War
0079	MTR & TTR pad	1963	Cold War
0080	Interconnecting corridor	1961	Cold War
0081	Pad for control vans	1961	Cold War
0082	Pad for control vans	1961	Cold War
0083	Pad for control vans	1961	Cold War
0087	HIPAR tower (gone)	1961	Cold War
0089	Water tank	1961	Cold War
0090	Bore site mast (gone)	1961	Cold War
T-150	Guard tower	c. 1961	Cold War
T-151	Guard tower	c. 1961	Cold War

Source: IAR11 2003

#### Kawailoa Training Area

Archaeological surveys have been conducted of selected areas within KLOA, primarily in the gulches in the west portion of the project area, and 55 archaeological sites have been identified. All sites have been recommended as eligible for listing on the NRHP, and several also might be considered ATIs. Table 7-26 lists the currently identified sites within KLOA that are recommended as eligible for the NRHP.

#### Drum Road

Pacific Legacy has surveyed the proposed alignment for the construction and upgrade of Drum Road and found 23 archaeological sites within or near the area of impact of the Drum Road upgrade in KTA (Pacific Legacy 2002).

Drum Road starts from the northwest area of HMR. Fankhauser recorded three historic sites in Helemanō Gulch just north of HMR (Fankhauser 1987).

### ***Potential for Unknown Resources***

#### Kahuku Training Area

The site probability model presented by Williams and Patolo (1998, 77-81; see also Williams and Patolo 1998, 79, Figure 23) offers a low probability for archaeological sites in low elevation areas because they have been subjected to extensive land-altering disturbances from sugarcane and pineapple farming and military use. Areas in the rugged interior of KTA, above the 800-foot (244-meter) elevation, which have seen no modern land use alterations and which Native Hawaiians could have used for resource exploitation (e.g., farming), have no surface visibility. Areas of medium site location probability include narrow gulches and the lower elevations between 600 and 800 feet (183 and 244 meters). These areas have had less modern land use alterations and are closer to the populated coastal flatland bordering KTA. Areas of high site location probability include bluff slopes and edges and the mouths of narrow gullies because these areas have suffered less modern land disturbances and they border the coastal flatlands. Through archival research, Williams and Patolo (1998, 81) discovered that bordering coastal flatlands were the primary settlement areas in the past.

The proposed sites for constructing the CACTF at KTA lie in areas designated as sensitive for archaeological resources (IARII 2003; Davis 1981). Figures 7-27 and 7-28 show areas of archaeological sensitivity at KTA and KLOA.

#### Kawailoa Training Area

Some of KLOA has not been surveyed for cultural resources due to the difficulty of access. The very rugged steeply sloped terrain has a low site location probability. Unsurveyed areas with similar topography as those areas known to contain archaeological sites, however, have a high probability of unrecorded sites. Because the type of use or use areas are not going to change, there is a low probability for unrecorded cultural resources to be disturbed.



Table 7-26  
Archaeological Sites at KLOA

State Site No.	Site Type	Description
50-80-04-5634	Wall complex	Three retaining walls/ one align
50-80-04-5635	Single lava tube	Lava tube
50-80-04-5637	Single trail	Kawailoa Trail
50-80-04-5638	Single trail	Ko'olau Summit Trail
50-80-05-5605	Path, terraces	Historic path, dryland agriculture
50-80-05-5606	Multiuse complex	Agriculture/habitation/ceremonial complex
50-80-05-5607	Terrace complex	Four alignments/auwai
50-80-05-5608	Two align	alignments
50-80-05-5609	Terrace/lo'i fields	Alignments/earth berms/lo'i fields
50-80-05-5610	Terrace/lo'i fields	Three alignments/lo'i fields
50-80-05-5611	Terrace complex	"Island" ag site in Kawainui Stream
50-80-05-5612	Terrace complex	
50-80-05-5613	Terrace/platform complex	Two temporary habitations, platforms/align/planting areas
50-80-05-5614	Terrace complex	Align/platform
50-80-05-5615	Terrace complex	
50-80-05-5616	Terrace complex	
50-80-05-5617	Terrace system	Good species indicators
50-80-05-5618	Wall	15m wall
50-80-05-5619	Terrace system	Wall and three terraces
50-80-05-5620	Terrace complex	four terraces/planting areas
50-80-05-5621	Terrace complex	Three terraces/one long mound
50-80-05-5622	Terrace complex	Large lo'i system
50-80-05-5623	Terrace complex	Large lo'i system
50-80-05-5624	Single imu	Imu
50-80-05-5625	Terrace complex	Terrace walls/mounds/'auwai
50-80-05-5626	Terrace complex	
50-80-05-5627	Terrace complex	
50-80-05-5628	Terrace complex	
50-80-05-5629	single platform	Possible burial
50-80-05-5630	Terrace complex	Nine+ walls/two enclosures/several clearing mounds
50-80-05-5631	Single rock shelter	Rock shelter: possible burial
50-80-05-5632	Terrace complex	Small alignments
50-80-05-5633	Terrace complex	Small terrace walls
50-80-05-9510	Platform	Kawainui Platform
50-80-05-9511	Terraces	Kawaiiki Agricultural Complex
50-80-05-9512	Complex	Kawailoa Complex
50-80-05-9513	Enclosure	Kawainui Enclosure
50-80-05-9514	Platforms	Kawaiiki Platform
50-80-04-5717	Alignment, planting areas	Dryland agriculture
50-80-04-5718	Terrace remnant	Irrigated agriculture
50-80-04-5719	Pumping station	Sugarcane industry

**Table 7-26**  
**Archaeological Sites at KLOA (continued)**

State Site No.	Site Type	Description
50-80-04-5720	Terrace remnants, ahu	Dryland agriculture, marker
50-80-04-5721	Walls, trail	Dryland agriculture, animal pen, transportation
50-80-04-5722	Concrete slab, terrace	Gauging station
50-80-04-5723	Road facing, road	Transportation
50-80-04-5724	Alignment	Dryland agriculture
50-80-04-5725	Stacked wall, modified slope	Pool; unknown
50-80-04-5730	Alignment	Retaining wall
D6-32	Terraces	
D6-33	Terrace	
D6-34	Complex	Kainiki's house (LCA)
D6-40	House site	Mailou's house (LCA)
D6-41	Irrigation complex	pondfield system
D6-42	Small pondfield system	'Ili Koilau System
D6-43	Irrigation pondfield system	'Ili Pulepule System

Source: IARII 2003

#### Drum Road

There is a high probability that archaeological sites will be discovered during road construction of the segment traversing KLOA.

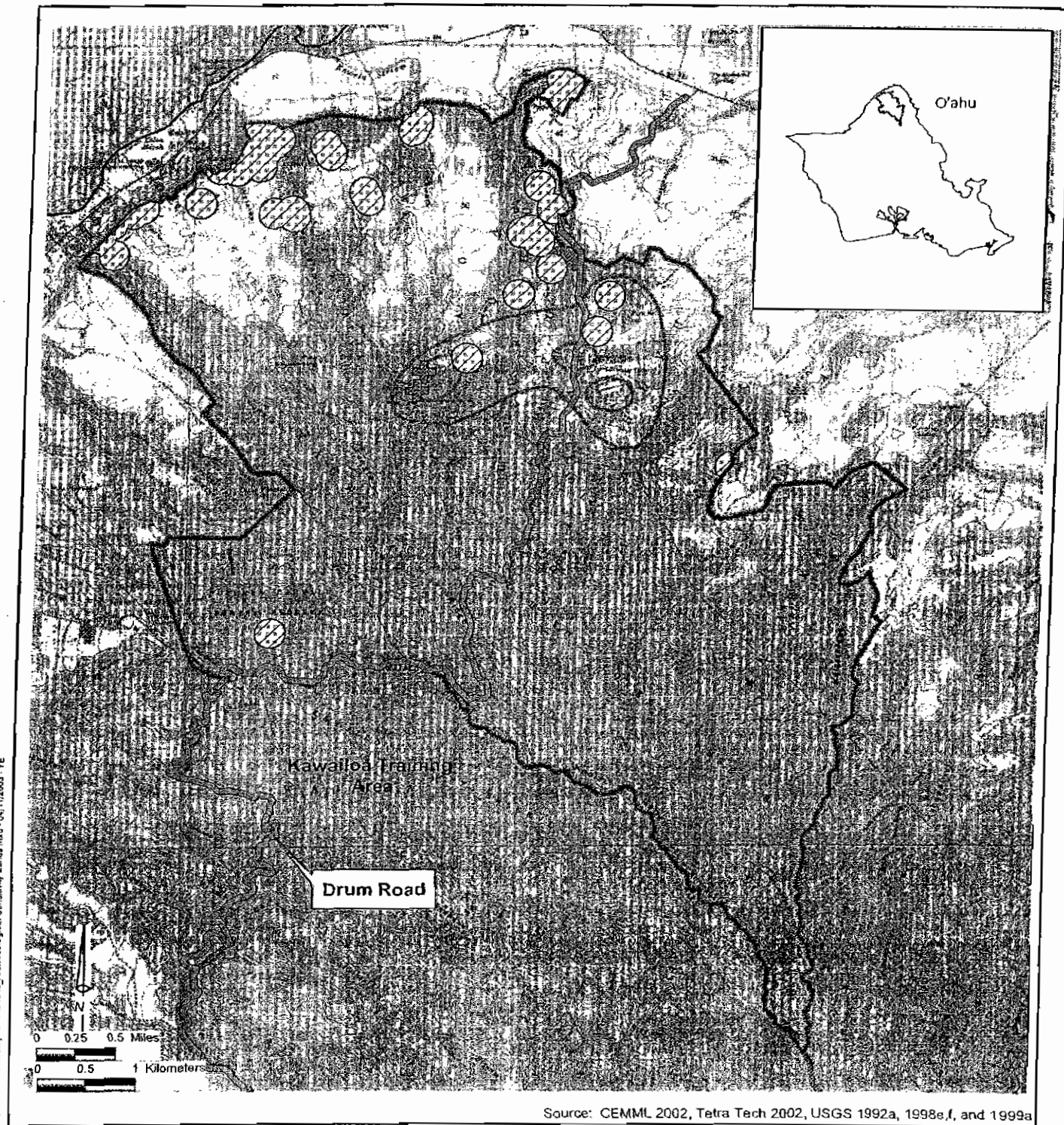
### 7.11.2 Environmental Consequences

#### Summary of Impacts

Cultural resources impacts related to the Proposed Action at KTA vary, depending on the location and the nature of the project. Significant impacts are likely for historic buildings from construction and demolition. Significant impacts mitigable to less than significant involve impacts on archaeological resources from range and facility construction (Table 7-27). As explained in the mitigation sections below, these impacts could be mitigated by compliance with the PA the Army has developed in consultation with the Hawai'i SHPO, the ACHP, Native Hawaiians, and other parties. The PA is provided in Appendix J. The three less than significant impacts identified are the risk to archaeological resources from training activities, the risk to unidentified ATIs, and impacts on archaeological resources from road use. These impacts will be mitigated by compliance with the PA and the IDP and monitoring by installation personnel.



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Archaeological Sensitivity Areas have been compiled from many sources for Kahuku Training Area.

#### Legend

- Archaeological Sensitivity Zones
- Drum Road
- Kahuku Training Area Boundary
- S7 Fixed Tactical Internet
- K1 Tactical Vehicle Wash
- K2 Combined Arms Collective Training Facility
- Roads

## Archaeological Sensitivity Areas at Kahuku Training Area

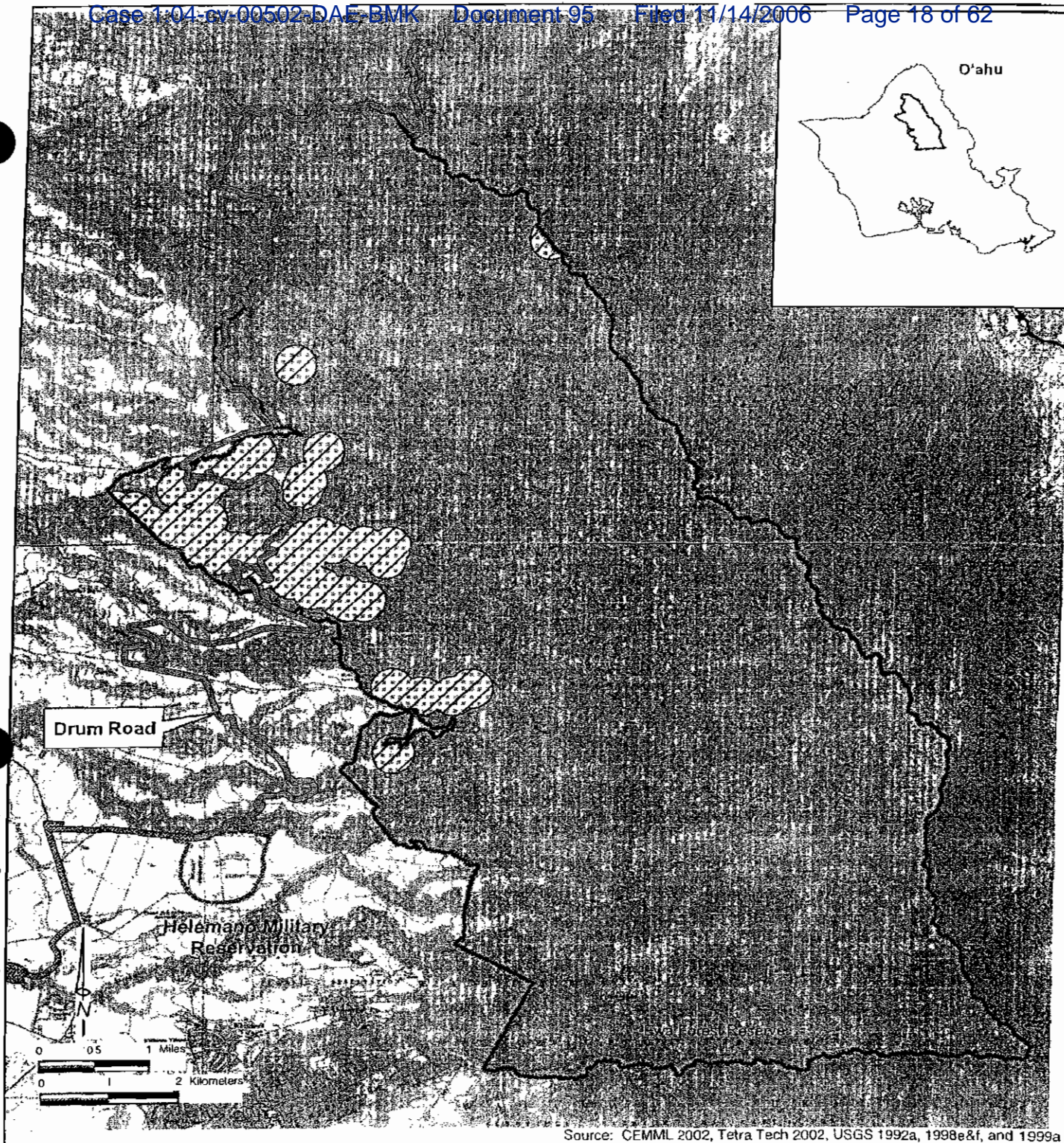
O'ahu, Hawai'i

**Figure 7-27**

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Source: CEMML 2002, Tetra Tech 2002, USGS 1992a, 1998e&f, and 1999a

Archaeological Sensitivity Zones have been compiled from many sources for Kawaihoa Training Area.

#### Legend

- Helemano Trail
- Drum Road
- Roads
- Kawaihoa Training Area Boundary
- Helemano Military Reservation
- Archaeological Sensitivity Areas

## Archaeological Sensitivity Areas at Kawaihoa Training Area

O'ahu, Hawai'i

**Figure 7-28**



Table 7-27  
Summary of Potential Cultural Resources Impacts at KTA/KLOA

Impact Issues	Proposed Action	Reduced Land		Acquisition		No Action	
		KTA	KLOA	KTA	KLOA	KTA	KLOA
Impacts on historic buildings		⊗	○	⊗	○	○	○
Impacts on archaeological resources from range and facility construction		⊗	○	⊗	○	○	○
Impacts on archaeological resources from training activities		○	○	○	○	○	○
Impacts from FTI tower construction		○	○	○	○	○	○
Impacts to ATIs		○	○	○	○	○	○
Impacts to archaeological sites from road use		○	○	○	○	○	○

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

**LEGEND:**

- ⊗ = Significant + = Beneficial impact  
 ⊗ = Significant but mitigable to less than significant N/A = Not applicable  
 ○ = Less than significant  
 ○ = No impact

***Proposed Action (Preferred Alternative)***

Significant Impacts

Impact 1: Impacts on historic buildings. Constructing the CACTF could have significant impacts on historic buildings at KTA. This project would involve renovating ten buildings in three sites and demolishing buildings S150 and S151. Among the properties to be renovated are the recommended eligible Nike Missile Site and other buildings that may be eligible for the NRHP as Cold War-era properties.

Regulatory and Administrative Mitigation 1. The Army will consult with SHPO, ACHP, and interested parties, in accordance with Section 106 of the NHPA, on the Nike Missile Site complex. The Army will manage the complex and will renovate it in compliance with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

Significant Impacts Mitigable to Less than Significant

Impact 2: Impacts on archaeological resources from range or facility construction. The tactical vehicle wash and the CACTF either overlay or are adjacent to identified archaeological resources.

All of the CACTF has been surveyed and three sites were located. Site 50-80-02-4884, approximately 984 feet (300 meters) northwest of Site 1, was fully excavated in the 1990s and was identified as a cooking feature used during tree cutting activities. The tactical vehicle wash has been surveyed, and the project area contains no identified cultural resources.



However a stepped stone platform (site 50-80-02-9508) is in the gulch immediately northeast of the project area, and a heiau (site 50-80-02-2501) is only a short distance to the northwest.

Facility construction involves grubbing vegetation, grading site surfaces, excavating the subsurface, and moving heavy construction equipment. All of these activities could result in direct destruction of or damage to archaeological resources or indirect damage by contributing to soil erosion. Sites 9508 and 2501 could be indirectly affected by runoff and erosion during construction of the tactical vehicle wash. USARHAW will conduct the mitigations described below, which will reduce impacts to less than significant.

Regulatory and Administrative Mitigation 2. Before construction, the Army will complete evaluating any archaeological sites within areas subject to range and facility construction. Sites determined to be eligible for the NRHP will be flagged for avoidance. The projects will be designed to avoid all eligible and unevaluated archaeological sites, to the full extent practicable. GIS and GPS information will be given to project designers and range control to ensure that sites are considered in project design. If it is not possible to avoid archaeological sites, the Army will consult in accordance with the PA to determine the appropriate mitigation for the damage to the sites, such as data recovery or other mitigation measures. To address the accidental discovery of archaeological sites, human remains, or cultural items, the Army has developed an inadvertent discovery plan as part of the PA.

#### Less than Significant Impacts

Impacts on archaeological resources from training activities. There are not likely to be significant increased impacts on archaeological resources on the KTA training areas from off-road tactical vehicle maneuvers and other military training activities. Known archaeological sites have a buffer area delineated as a no use area. Possible impacts would include accidental discoveries of unknown archaeological resources and damage to them as a result of training activities on the range. Additionally, as discussed under geological resources, Strykers exert a greater amount of force on the ground than do vehicles previously used on training areas. Off road mounted maneuvers with Strykers could result in greater indirect impacts through contribution to erosion.

These impacts will be mitigated by regular monitoring by cultural resources personnel, and compliance with the IDP developed as part of the PA, as described above. If sites were discovered as a result of erosion or training exercises, the PA provides for compliance with the provisions of NAGPRA and ARPA in case of accidental discovery of human remains, cultural items, or archaeological materials. All known sites will be evaluated for eligibility to the NRHP and flagged for avoidance.

Impacts on Areas of Traditional Importance. The ATIs that have been identified at KTA are outside the boundaries of the project areas for the construction and use of the CACTF and tactical vehicle wash. However, further oral historical and archival research might result in the identification of ATIs that could be affected by these projects. Any identified ATIs will be avoided where feasible. Construction or training area uses will be designed to avoid identified traditional places and to minimize visual impacts on traditional cultural landscapes by site location, design, and orientation, where feasible.

## 8.10 BIOLOGICAL RESOURCES

### 8.10.1 Affected Environment

#### *Introduction/Region of Influence*

Biological resources include plant and animal species and the habitats or communities in which they occur. This section is divided into discussions of general wildlife, vegetation, and habitat types common to PTA, including sensitive species and habitats known to occur or with the potential to occur in this area. Federal, state and locally regulated species are included in this report, along with rare species, identified by rapid population decline or whose habitat has markedly decreased in recent years.

The terrestrial portion of the PTA ROI (Figure 8-32) was based largely on the potential for damage from fires during training and, in the case of the military vehicle trail, damage due to the expansion of and increased activity on the trail. Fire has been evaluated to be the most far-reaching impact on PTA, with the exception of PTA Trail, because of its ability to affect a large area. Degradation of habitat due to physical activities around PTA Trail would have the greatest potential impact on the area due to the nature of activities proposed and allowed in their vicinity. The terrestrial portion of the PTA ROI also includes a 164-foot (50-meter) buffer on either side of the proposed trail, as well as a portion of the coast over which aircraft maneuvers may occur.

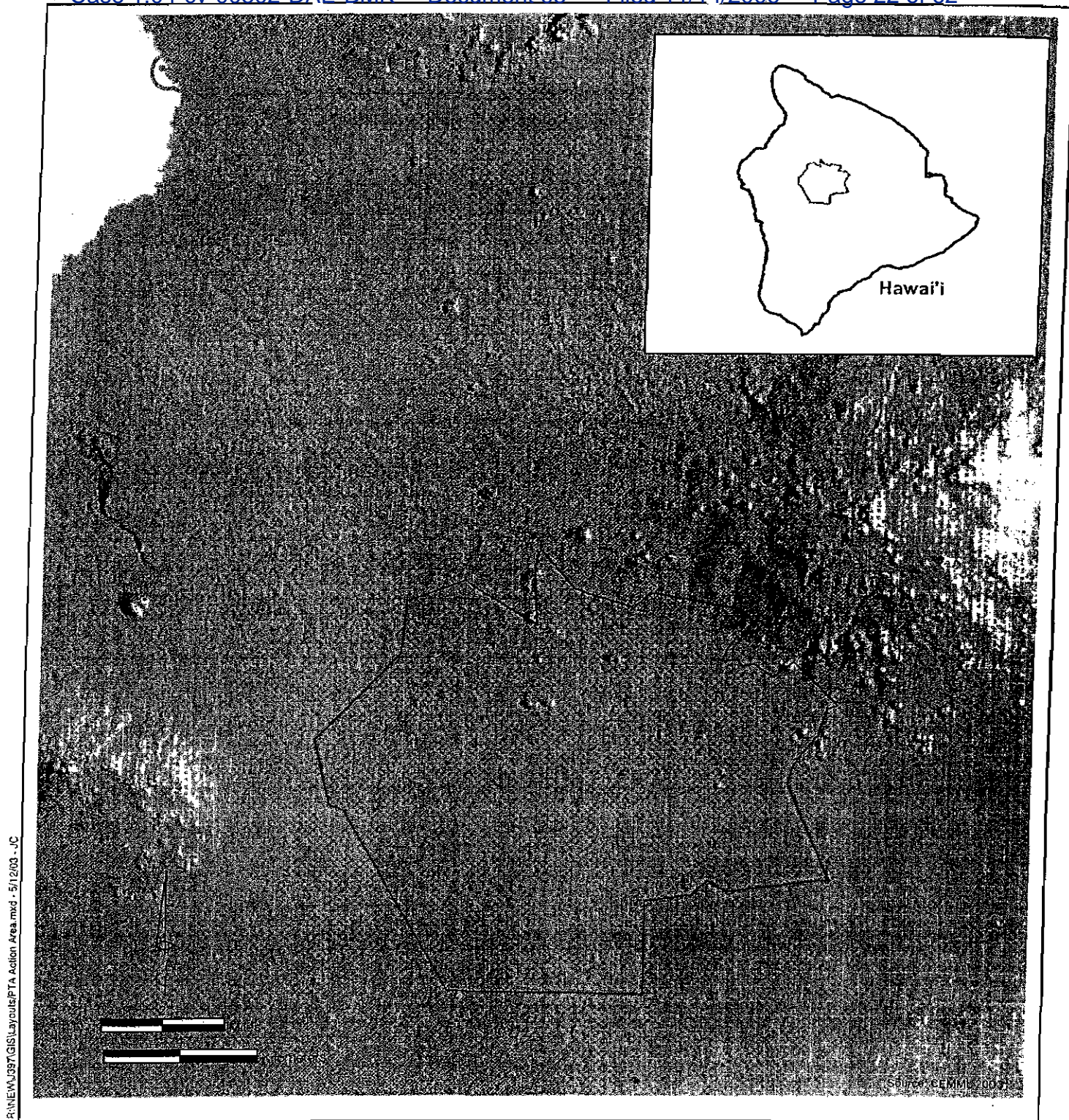
The marine portion of the PTA ROI (Figure 8-32 and Figure 3-13) involves the nearshore and offshore Pacific waters between O'ahu and the island of Hawai'i, the Pearl Harbor area of O'ahu, the Kawaihae Harbor area of the island of Hawai'i, and adjacent coastlines to the harbors. Marine habitat was considered because there will be continuing and slightly increased vessel transport of troops back and forth from O'ahu and the island of Hawai'i. Portions of this area are within the Hawaiian Islands Humpback Whale National Marine Sanctuary waters. Also, the construction of a fixed tactical tower at the Kawaihae Harbor area could potentially impact marine habitat. No harbor construction work is considered as part of this project action as impact analyses of that action would occur under separate NEPA documentation. The location and sensitivity of these marine ecosystems were taken into account when determining the marine portion of the PTA ROI for the Proposed Action.

Biological data were collected from numerous sources, including the USFWS, NMFS, HDLNR, HBS, HINHP, US Army PTA, and various biological surveys and environmental documents that are cited throughout this document. For details on pertinent regulations see Appendix N.

#### *Recovery Plans*

Thirteen plant and six animal species with recovery plans are known to or have the potential to occur within the PTA ROI. These species are listed in Appendix I-1a.





The Pōhakuloa Training Area Region of Influence is based on the potential impact of fire and trampling, and includes coastal areas in the proximity of project activity.

#### Legend

- Pōhakuloa Training Area
- Region of Influence
- Aquatic Region of Influence

## Terrestrial and Aquatic Biological Region of Influence at the Pōhakuloa Training Area

Island of Hawai'i, Hawai'i

**Figure 8-32**

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Whales and Dolphins Potentially Occurring in Hawaiian Waters of the PTA ROI

Non-ESA listed but MMPA-protected marine mammals considered to have the potential to be found in Hawaiian waters, or in waters of the PTA ROI, include the following:

- Bryde's whales (*Balaenoptera edeni*);
- Minke whales (*B. acutorostrata*);
- Pygmy sperm whales (*Kogia breviceps*);
- Dwarf sperm whales (*K. sinus*);
- Killer whales (*Orcinus orca*);
- False killer whales (*Pseudorca crassidens*);
- Pygmy killer whales (*Feresa attenuata*);
- Pilot whales (*Globicephala macrorhynchus*);
- Beaked whale species (*Mesoplodon* and *Ziphius* spp.);
- Baird's beaked whale (*Berardius bairdii*);
- Melon-headed whales (*Peponocephala electra*);
- Bottlenose dolphins (*Tursiops truncatus*);
- Spinner dolphins (*Stenella longirostris*);
- Rough-toothed dolphins (*Steno bredanensis*);
- Risso's dolphin (*Grampus griseus*);
- Striped dolphin (*Stenella coeruleoalba*);
- Common dolphin (*Delphinus delphis*); and
- Several species of spotted dolphins, the most common of which is *Stenella attenuata*.

The natural history of these species, as well as specific documented locations either in or near the PTA ROI (if known), are described in Appendix I-1.

**Sensitive Species**

A list of all sensitive vegetation and wildlife and any critical habitat found in the region, according to USFWS and DLNR records, is found in Tables 8-19 through 8-21. An assessment of the likelihood of a species occurring on PTA was made where possible, based on the habitat requirements and geographic distribution of the species, existing on-site habitat quality, and the results of biological surveys of PTA. The Army has undergone ESA Section 7 consultation with USFWS for previous Army training and actions that would affect listed species such as the palila and its federally designated critical habitat (USFWS 1978, USFWS 1983a) as well as other listed species on the premises (USFWS 1986b). Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, are in Appendix I-1 (Recovery Plans I-1a; Plants I-1b; Wildlife I-1c; Critical Habitat I-1d).

### Sensitive Plant Species

The Army has funded botanical surveys on PTA since 1988, though other surveys date as far back as 1888 (USARHAW and 25<sup>th</sup> ID[L] 2001b). Approximately 38 percent of the plants found on PTA are indigenous or endemic. Endangered species, threatened species, and species of concern (all according to federal guidelines) are found on PTA, as well as a new species (*Tetramolopium* unnamed sp.) that could be included on the endangered species list as it is known only from three small populations on PTA. State and locally regulated rare species are included in this report, along with species that have experienced rapid population decline or whose habitat has markedly decreased in recent years. Table 8-20 lists sensitive plant species and their potential to occur in the PTA ROI. Documented occurrences of sensitive plant species in the PTA ROI are shown in Figure 8-34.

### Sensitive Wildlife Species

The following discussion includes a profile of only those sensitive wildlife species considered likely to be found in the project area. This information is based primarily on information from the PTA INRMP (USARHAW and 25<sup>th</sup> ID[L] 2001b, R. M. Towill Corp. 1997c); special species wildlife information was based on surveys conducted on PTA. In 1990 Dr. Freed conducted bird and mammal surveys at PTA (Freed 1991). Later surveys include David's two endangered and threatened species surveys conducted along designated palila critical habitat (David 1995), Cooper's studies of endangered seabirds and Hawaiian hoary bat (Cooper et al. 1996), and the HINHP's arthropod inventory (USGS 2001b). Annual avian surveys, with a focus on sensitive species, have been conducted on PTA since 1997 (HINHP 1998; Schnell et al. 1998; Schnell et al. 1999). The latest USFWS and survey information on species and habitat in the SBCT ROI has been incorporated into this evaluation of biological resources.

Nineteen sensitive species have been determined to have the potential to occur within the PTA ROI (USARHAW and 25<sup>th</sup> ID[L] 2001b). Information regarding the locations of sensitive species on PTA is based on previous analyses of PTA natural resources (USARHAW and 25<sup>th</sup> ID[L] 2001b; R. M. Towill Corp. 1997c; HINHP 2002). The majority of these species observations have been on the west and northwest of PTA where the BSAs are located. Little information is known as to species occurrences within the impact area because zoological surveys have not been conducted due to safety hazards. Table 8-21 lists sensitive terrestrial wildlife and their potential for occurring on the island of Hawai'i and Figure 8-35 shows the locations of sensitive terrestrial wildlife documented on the PTA ROI.

### Marine Wildlife

Six species of endangered whales occur in the Pacific tropical waters of Hawai'i. Of these, only one is considered likely to occur in the PTA ROI waters. This is the humpback whale (*Megaptera novaeangliae*). The other listed species are the fin (*Balaenoptera physalus*), blue (*Balaenoptera musculus*), sei (*Balaenoptera borealis*), and pacific right (*Eubalaena glacialis*); and the sperm whale (*Physeter macrocephalus*).

Table 8-20  
Sensitive Plant Species Occurring on or Potentially Occurring at PTA ROI

Scientific Name	Hawaiian Name/Common Name	Federal Status <sup>1</sup>	State <sup>2</sup> /Global Status <sup>3</sup>	Habitat	Date Last Surveyed	Likelihood of Occurrence
<i>Asplenium fragile</i> var. <i>insulare</i>	-/fragile fern, lola	E, CH	-/-	Dry forest, subalpine shrubland, barren lava, and lava tubes	1999	C
<i>Chamaecryce olowaluana</i>	'akoka, kōkōmālei/ Maui milk tree	SOC	-/G2	Multiple tree and shrubland types on PTA	1999	C
<i>Cystopteris douglasii</i>	-/-	SOC	-/G2	Myoporum forest and shrubland	1999	C
<i>Dubautia arborea</i>	na'ena'e/-	SOC	-/-	Subalpine shrub and woodlands and alpine desert	1999	C
<i>Eragrostis deflexa</i>	Kalamalo/bent lovegrass	SOC	-/G1	Multiple treeland and shrubland habitats on PTA	1999	C
<i>Exocarpos gaudichaudii</i>	heau/whisk broom sandalwood	SOC	-/G1	Multiple treeland communities associated with <i>Metrosideros</i>	1999	C
<i>Festuca hawaiiensis</i>	-/Hawaiian fescue	C	-/G1	Multiple treeland and shrubland habitats on PTA	1999	C
<i>Haplostachys haplostachya</i>	honnbono/Hawaiian mint	E	-/G1	Multiple treeland and shrubland habitats on PTA, though with very small populations	2002	C
<i>Hedyotis coriacea</i>	Kio'ele/-	E, CH	-/G1	<i>Metrosideros</i> treeland communities	1999	C
<i>Hesperocnide sandwicensis</i>	-/-	C	-/G1	All native vegetation communities at PTA	1999	C
<i>Iiodendron hosakae</i>	aupauka/-	E	-/-	Several dry shrubland habitats	2002	C
<i>Lipochaeta venosa</i>	nehe/-	E	-/-	Dry shrubland	1999	C
<i>Mediocrpe hawaiiensis</i>	manena/-	SOC	-/G2	<i>Metrosideros</i> treeland and <i>Dodonaea</i> shrubland	1999	P
<i>Nerandia ovata</i>	ma'aloa, ma'oloa/ spotted nettle brush	E, CH	-/G1	<i>Metrosideros</i> treeland and <i>Myoporum</i> shrubland communities	1999	C
<i>Portulaca sclerocarpa</i>	'ihi, poc/hard fruit purslane	E, CH	-/G1	Barren lava and <i>Metrosideros</i> treeland communities	1999	C
<i>P. villosa</i>	-/-	-	-/G1	<i>Metrosideros</i> treeland communities	1999	P
<i>Schiedea hawaiiensis</i>	ma'oli'oli/-	SOC	-/-	Subalpine dry forests	1999	C
<i>Silene hawaiiensis</i>	-/Hawaiian catchfly	T, CH	-/G1	Multiple tree, shrub, and grasslands and on barren lava	2002	C
<i>S. lanceolata</i>	-/lanceleaf catchfly	E, CH	-/G1	Multiple tree, shrub, and grasslands and in dry habitats	1999	C



**Table 8-20**  
**Sensitive Plant Species Occurring on or Potentially Occurring at PTA ROI (continued)**

Scientific Name	Hawaiian Name/Common Name	Federal Status <sup>1</sup>	State <sup>2</sup> /Global Status <sup>3</sup>	Habitat	Date Last Observed	Likelihood of Occurrence
<i>Solanum incompletum</i>	pōpolo kū mai/-	E, CH	-/GH	Sparse <i>Metrosideros</i> treelands and <i>Myoporum</i> shrublands	1997	C
<i>Spermolepis banaiensis</i>	-/Hawaiian parsley	E, CH	-/G1	Multiple tree, shrub, and grasslands and in dry habitats	1999	C
<i>Stenogyne angustifolia</i>	Ma'ohi'ohi/creeping mint	E	-/G1	Multiple tree and shrublands and on barren lava	2002	C
<i>Tetramolopium menziesii</i> var. <i>arenarium</i>	-/Mauna Kea pāmakani	E, CH	-/G1	<i>Dodonaea</i> mixed shrubland	1999	C
<i>T. unnamed</i> sp. <i>leptophyllum</i> var. <i>leptophyllum</i>	-/narrow leaf pāmakani	-	-/G1	Multiple tree and shrubland communities	1999	C
<i>Vigna o-mahuensis</i>	mohibihi/-	E, CH	-/-	Lowland shrublands, dry to moist	2002	C
<i>Zanthoxylum hawaiiense</i>	hea'e, a'e/Hawaiian yellow wood	E, CH	-/G1	<i>Metrosideros</i> dominates dry and moist forests and on barren lava	2002	C

Sources: USFWS 2002b; USARHAW and 25<sup>th</sup> ID[L] 2001b; HINHP 2002; Shaw 1997

**Status:**

**<sup>1</sup>Federal:**

E = Endangered

T = Threatened occurrences)

SOC = Species of concern

C = Candidate species for listing

CH = Critical habitat designated

**<sup>3</sup>Heritage Global Rank:**

G1 = Species critically imperiled globally (typically 1-5 current

G2 = Species imperiled globally (typically 6-10 current occurrences)

GH = Species known only from historical occurrences

/-/- = No Status

**<sup>2</sup>State**

/-/- = No Status

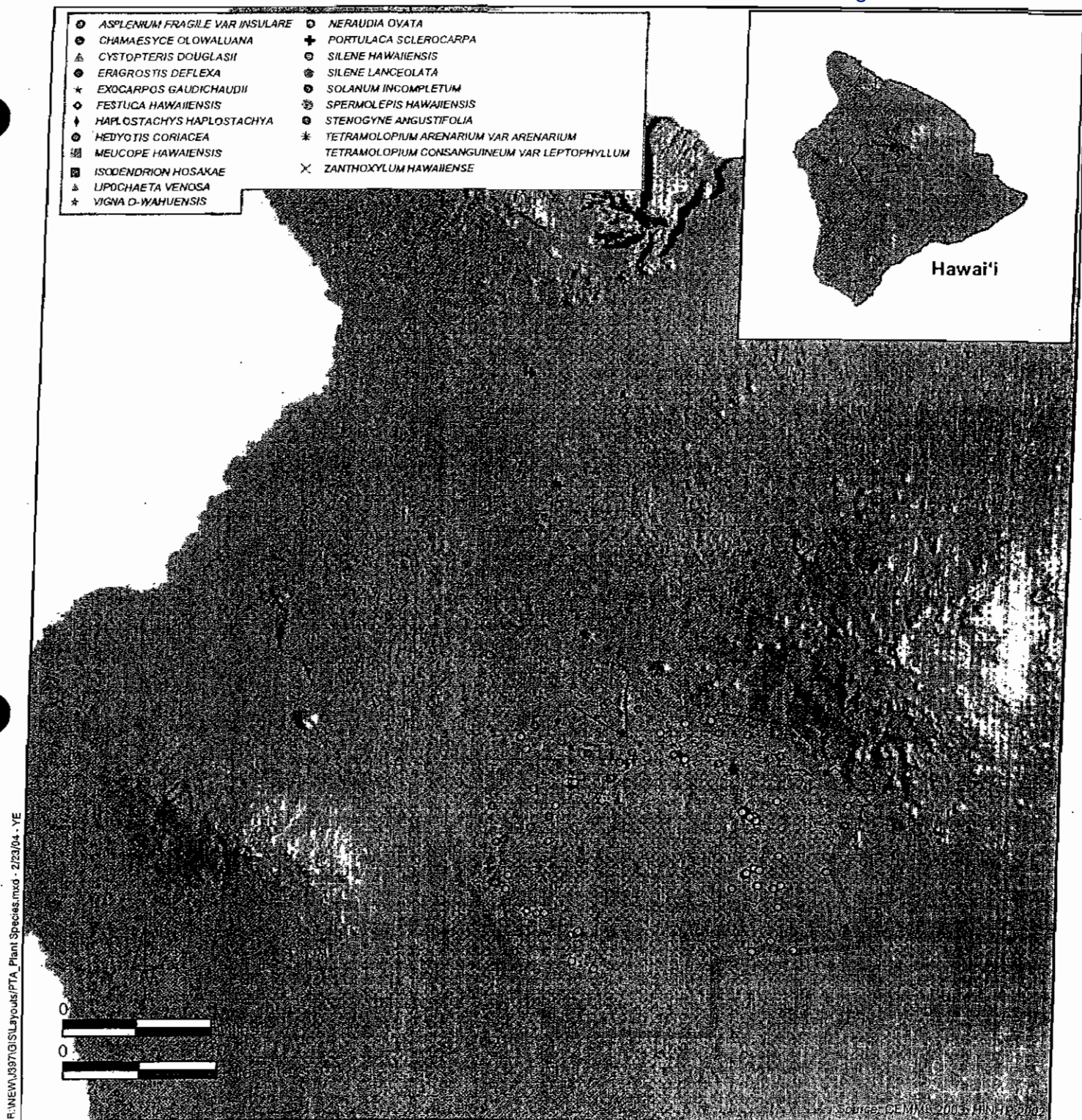
**Likelihood of occurrence on the project site**

C = Confirmed

P = Potentially may occur

U = Unlikely to occur





There are 15 federally listed plants recorded within the Pōhakuloa Training Area Region of Influence

## Sensitive Plant Species in the Pōhakuloa Training Area Terrestrial Biological Region of Influence

Island of Hawai'i, Hawai'i

**Figure 8-34**

8-150

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## 8.10 Biological Resources

Table 8-21  
Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at PTA ROI

Scientific Name	Hawaiian Name/ Common Name	Federal Status <sup>1</sup>	State/Global Status <sup>2</sup>	Habitat	Date Last Observed	Likelihood of Occurrence
<b>Invertebrates</b>						
<i>Fluconulus (Neononulus) sp. cf. gasterot</i>	-/snail	SOC	-/-	Not available	1998	C
<i>Helicoverpa confusa</i>	-/Hawaiian helicopter moth	SOC	-/G1	Not available	1998	C
<i>Leptothorax spp. (5 species)</i>	-/snail	SOC	-/G1	Not available	1998	C
<i>L. lepta</i>	-/Anasid land snail	SOC	-/-	Not available	1998	C
<i>Neopispa (Infranesopispa)</i>	-/snail	SOC	-/-	Not available	1998	C
<i>rebrastris</i>	-/snail	SOC	-/-	Not available	1998	C
<i>Neonitrea hawaiiensis</i>	-/snail	SOC	-/-	Not available	1998	C
<i>Phonocia sp.</i>	-/Giffard's rhyncogonus weevil	SOC	-/G1	Includes montane dry shrublands, dry to mesic forest and woodland	1998	C
<i>Rhyncogonus giffardi</i>	-/snail	SOC	-/-	Not available	1998	C
<i>Striatula (Pseudobryloma) sp. cf. Monstera</i>	-/snail	SOC	-/-	Not available	1998	C
<i>Striatula sp.</i>	-/snail	SOC	-/-	Not available	1998	C
<i>Succinea konacensis</i>	-/snail	SOC	-/-	Not available	1998	C
<i>Virina tenella</i>	-/snail	SOC	-/-	Not available	1998	C
<b>Birds</b>						
<i>Branta sandvicensis</i>	nēnē/Hawaiian goose	E	E/G1	Cropland, pasture, herbaceous rangeland, shrub brush rangeland, mixed rangeland, evergreen forest land, nonforested wetland, bare exposed rock and mixed barren land	1999	C
<i>Buteo solitarius</i>	'Io/Hawaiian hawk	E	E/G1	Cropland, hedgerow, hardwood forest, herbaceous grassland and hardwood woodland	1997?	P
<i>Chalcophaps indica sandvicensis</i>	'elepaio/-	*	-/G4	Native Hawaiian forest, hardwood woodland and forest, nonnative forest, riparian	2000	C
<i>Hemignathus mauri</i>	'akiapōlā'au/-	E	E/G1	Mesic to wet 'ōhi'a, koa-'ōhi'a, and koa-māmā forests, dry māmā and māmā-naio forests; most common in mesic koa forests and woodlands	1997?	C
<i>H. virens virens</i>	amakihi/-	+	-/G3	Humid 'ōhi'a forest, drier māmā-naio forest, subalpine scrub, at higher elevations and also in lowland mixed native-exotic forest	2000	C
<i>Limantora sanguiinea</i>	'apauane/-	+	-/G4	Hardwood forest, native and mixed native/nonnative forests in higher elevations	2000	C
<i>Loxia bairdi</i>	palila/-	E	E/G1	Māmā and māmā-naio forests	2000	C



## 8.10 Biological Resources

Table 8-21  
Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring at PTA ROI (continued)

Species (Scientific Name)	Hawaiian Name/ Common Name	Federal Status <sup>1</sup>	State <sup>2</sup> /Global Status <sup>3</sup>	Habitat	Date Last Observed	Likelihood of Occurrence
<i>Myadestes obsoletus</i>	'ōma'ō/-	+	-/G4	Primarily inhabits mesic and wet native 'ōhi'a and mixed 'ōhi'a and kōa forests above 1000 meters elevation; also found in mixed tree fern 'ōhi'a habitat in Hawaii's Volcanoes National Park, 'ōhi'a scrub on lava flows, kipukas, and treeless alpine scrub	Unknown?	P
<i>Pterodroma phaeopygia</i>	'ua'u/Hawaiian dark-rumped petrel	E	E/G1	Open ocean; breeds along barren mountain slopes	1996?	P
<i>Myadestes occidentalis</i>	'i'iwi/Hawaiian honeycreeper	+	-/G4	Native forests especially 'ōhi'a ( <i>Metrosideros</i> ) forest	1999?	P
<i>Lasiurus cinereus semotus</i>	-/Hawaiian hoary bat	E	E/G5T2	Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, and riparian habitats	1996	C

Sources: USARHAW and 25a ID[L] 2001b; HDLNR 2002a; R. M. Towill Corp. 1997b; USGS 2001b; NatureServe 2001; Virginia Tech 1998

## Notes:

\*The state endangered listing refers only to the populations on O'ahu, Lanai, and Molokai.

## Status:

## Federal:

E = Endangered

SOC = Species of concern

+ = Birds of Conservation Concern

## Heritage Global Rank:

G1 = Species critically imperiled globally (typically 1-5 current occurrences)

G3 = Species with restricted range, rare globally (typically 20-100 current occurrences)

G4 = Species apparently globally secure

G5 = Species demonstrably globally secure

T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)

T2 = Subspecies imperiled globally (typically 6-10 occurrences)

## State

E = Listed as endangered

/-/- = No Status

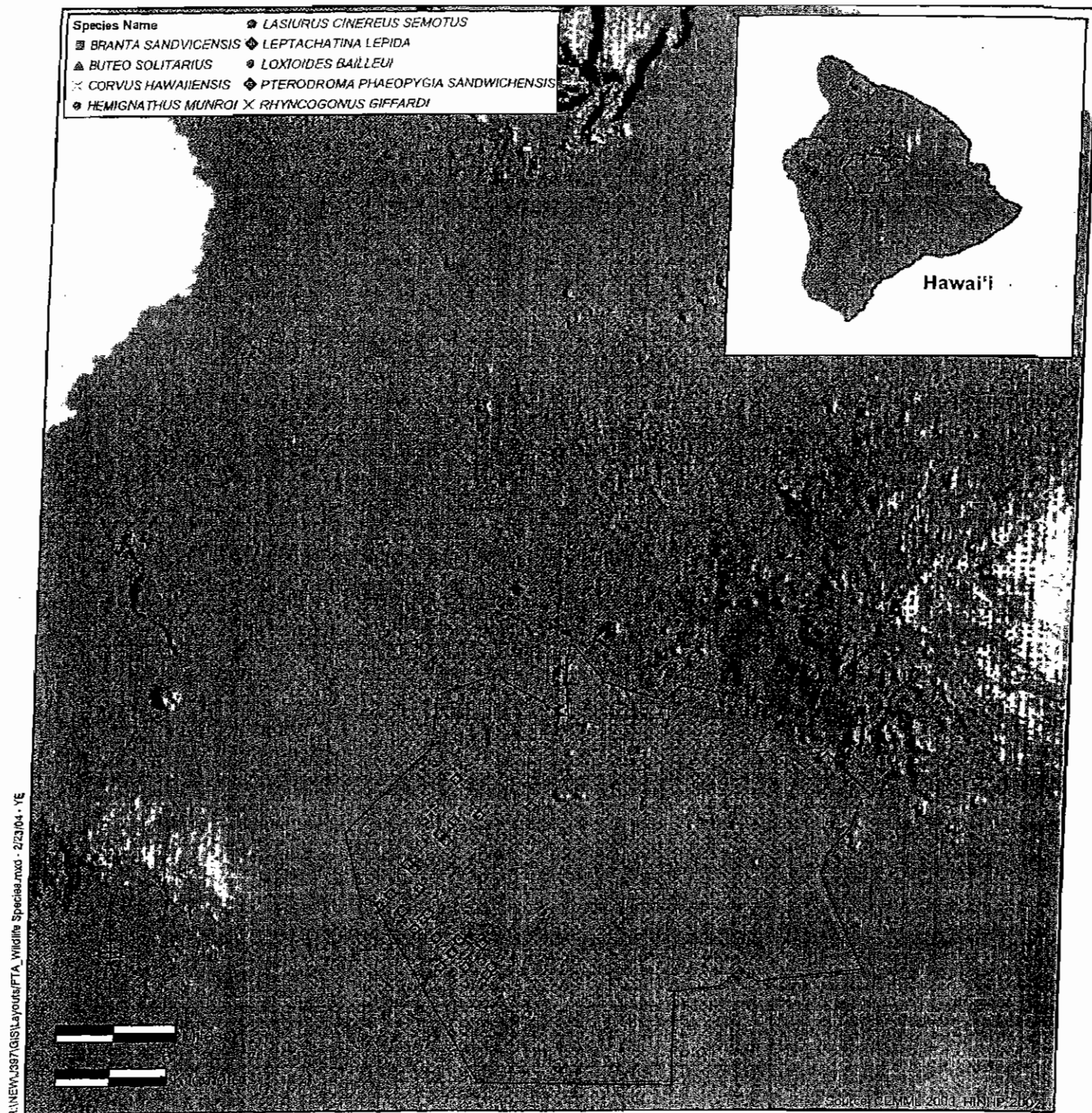
## Likelihood of occurrence on the project site

C = Confirmed

P = Potentially may occur

U = Unlikely to occur





Of the sensitive wildlife species reordere  
within the PTA ROI in recent history, six are  
federally endangered.

## Sensitive Wildlife Species in the Pōhakuloa Training Area Terrestrial Biological Region of Influence

**Legend**

- Pōhakuloa Training Area Boundary
- Region of Influence

Island of Hawai'i, Hawai'i

**Figure 8-35**

8-153

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There is one Federally listed endangered seal, the monk seal (*Monachus schauinslandi*). The monk seal has critical habitat in the northwestern portion of the Hawaiian Island chain, outside of the PTA ROI.

There are five listed sea turtles that could occur in the Pacific tropical waters of Hawai'i and could potentially occur in the PTA ROI. The most likely of these are the green sea turtle (*Chelonia mydas*), which is federally threatened, and the leatherback sea turtle (*Dermochelys coriacea*), which is federally endangered. The green sea turtle is the most likely to occur in the coastal portions of the PTA ROI. The leatherback turtle is expected to occur most commonly in offshore waters. Adult leatherbacks are commonly sighted in the waters off the outer Hawaiian Islands (NOAA Fisheries 2000z). The other species, i.e. the loggerhead (*Caretta caretta gigas*), hawksbill (*Eretmochelys imbricata*), and olive ridley (*Lepidochelys olivacea*), are less common but have the potential to occur. Hawksbills and green sea turtles nest annually on Hawaiian beaches (ONR 2000) though no nests for either species have been documented in the PTA ROI. The hawksbill species is considered uncommon in Hawaiian waters, but does have nesting sites on Hawai'i and Moloka'i (NOAA Fisheries 2000y) are distant from the ROI. Loggerheads and olive ridleys are known to occur in Hawaiian waters as they occur as bycatch in the longline fishery, but they are predominantly pelagic species. Loggerheads are known to spend 40 percent of their time at the surface, and olive ridleys are only at the surface 20 percent of the time and tend to be found in shallower waters than loggerheads (Polovina et al. 2000). Olive ridleys are the most abundant sea turtles in the world (Polovina et al. 2000) though they are less common in Hawaiian waters. Most records of olive ridley are from entanglements and strandings (NOAA Fisheries 2000aa).

The green sea turtle is expected to be the most common near the coastlines, while the other species would more likely be in the offshore waters along the transit lines for the vessels traveling between Oahu and the island of Hawai'i.

Of these ESA-listed marine wildlife, the most likely occurrences in the ROI would be for the humpback whale, the sperm whale, the monk seal, and both the green and leatherback sea turtle. Table 8-19 lists the likelihood of occurrence of these species within the project area and associated habitat and regulatory information. The natural history of these species, as well as specific documented locations either in or near the PTA ROI (if known), is described in Appendix I-1.

#### Humpback Whale (FE/MMPA)

The waters off the coasts of the Hawaiian Islands are known for their seasonal population of humpback whales, which are also the most abundant marine mammal throughout the Hawaiian waters (Mobley et al. 2001). The Hawaiian Islands serve as an important breeding ground for this species (Calambokidis et al. 1998). The humpback whale is the only one of the five endangered baleen whales potentially occurring in Hawaiian waters that is known to be present in reasonably large numbers. The International Whaling Commission and NOAA Fisheries consider the Hawaiian population of humpbacks to be a separate stock (NOAA Fisheries 2000a). Humpback whales are found throughout the island chain and are most abundant in coastal waters of the main Hawaiian Islands, including Hawai'i and O'ahu, from November through April, with peak abundance occurring from late February through mid-

March (Baker and Herman 1981). Approximately two-thirds of the entire North Pacific humpback whale population (approximately 4,000 to 5,000 whales) migrate to Hawaiian waters to breed, calve, and nurse (NOAA Fisheries 2000a). These whales are generally found in shallow waters shoreward of the 600-foot (183-meter) depth contour (ONR 2000).

Humpback whale mothers and calves prefer the calmer shallower waters often found on the leeward sides of the islands (Smultea 1992), and they prefer very shallow water less than 60 feet (18 meters) (ONR 2000; Smultea 1992). Some results suggest that habitat use patterns of females and calves in nearshore areas may decrease as a result of increasing vessel traffic and human activities (ONR 2000). Humpback whales are vulnerable to human disturbance in Hawaiian waters and possibly to vessel strikes. Hawai'i regulations prohibit boats from approaching within 100 yards (91 meters) of adult whales and within 300 yards (274 meters) of mother/calf pairs. Humpback whales (of varying pod sizes and types, including mother and calf pods) are commonly sighted off the O'ahu coast and are confirmed in project area waters, though with unknown frequency, from January through April (Pickering 2003; Clark and Tyack 1998).

#### Monk Seal (E/MMPA<sub>2</sub>D)

The monk seal is the only pinniped (seal species) known to occur in the Hawaiian archipelago, and it is endemic. This species may occasionally occur in the waters or shore of the ROI. However, it is more common in the northwest island chain. Incidental transients are known at all of the main seven islands, and two individuals are known from the North Kohala area of the island of Hawaii. There is a small uncounted population on the island of Ni'ihau (NOAA Fisheries 2000w). The species was designated as depleted under the MMPA in 1976, following a large decline in animal counts from the late 1950s and mid 1970s. The monk seal was also listed as endangered under the ESA in 1976. In 1988, NOAA Fisheries designated critical habitat for the Hawaiian monk seal but this area is quite distant from the ROI. It is designated in 10 areas of the northwestern Hawaiian Islands, extending from shore to a distance offshore to 20 fathoms (180 feet, or 55 meters) of depth. The species is managed as one stock, though each island may in fact have its own subpopulations (NOAA Fisheries 2000w). Virtually nothing is known about its distribution and movement patterns when it is at sea. Current estimates indicate that the monk seal population is declining and is believed to include approximately 1,000 animals. Hawaiian monk seals breed primarily at Laysan Island, Lisianski Island, and Pearl and Hermes Reefs but also are known to use the Midway Islands, among other northwest Hawaiian Islands (NOAA Fisheries 2000w).

#### Green sea turtle (FT)

The green sea turtle is considered the most abundant turtle in Hawaiian waters (Zug et al. 2002; ONR 2000; NOAA Fisheries 2000x-z, 2000aa, 2000bb). The Hawaiian population of nesting green sea turtle comprise a distinct genetic unit (Zug et al. 2002). Except during their post-hatching pelagic phase, this species spends the majority of time in coastal waters, shallow bays, and nearshore areas where foraging is optimal (Brill et al. 1994; Zug et al. 2002). Juveniles and subadult green turtles are especially abundant in the nearshore areas. These turtles have nested on all of the seven main islands (Dollar 1999). The most accurate abundance estimates for adult female green turtles which nest annually on Hawaiian beaches are from 450 to 475 animals, with the majority of reproduction taking place at the French



Frigate Shoals (Balazs 1980; NOAA Fisheries 2000x, 2000y). Submergence intervals vary by behavior. When the animals are resting, they have regular, long submergence intervals. When feeding, submergence intervals are short and irregular (Brill et al. 1994). In Hawaii, 40 – 60 percent of immature green sea turtles suffer from fibropapillomatosis, a disease that causes tumor growth (Work et al. 2003). Studies are currently ongoing to assess the impacts of these tumors on the animal's behavior.

Green sea turtles are expected to occur especially in the coastal portions of the ROI or on beach habitats. This species is known to feed on marine plants that occur in the ROI and in the nearshore areas. The PTA ROI does have sea turtle foraging and resting areas. Green sea turtles have been shown from some Hawaiian areas to remain within a small portion of a habitat area if foraging and rest habitat is optimal there, and to have short submergence intervals (Brill et al. 1994). During the breeding season, adult green sea turtles undertake long-distance oceanic migrations from feeding areas throughout the Hawaiian archipelago to nesting beaches at French Frigate Shoals, Laysan Island, Lisianski Island, Pearl Reef and Hermes Reef, Cute Atoll, and Midway Island. It is hypothesized that green turtles in the Hawaiian archipelago could be a genetically distinct subpopulation (NOAA Fisheries 2000x). The majority (90 percent) of green turtle nesting in the Hawaiian Islands occurs far distance from the ROI at the French Frigate Shoals, the portion of the islands that are 800 miles (1,482 kilometers) northwest of the main Hawaiian Islands, consisting of a string of 11 small island regions.

#### Leatherback sea turtle (FE)

Leatherbacks do not nest regularly or in great numbers in the Hawaiian Islands (NOAA Fisheries 2000x, 2000aa). Adult leatherbacks are commonly sighted in the Pacific Ocean near the Hawaiian archipelago, primarily over deep oceanic waters. Leatherbacks could occur equally as frequently off any of the main seven islands, but they are often sighted off the north shores of both O'ahu and the island of Hawai'i (NOAA Fisheries 2000z; ONR 2000). They are considered to have the potential to occur in ROI waters (NOAA Fisheries 2000z).

#### **Sensitive Habitats**

##### Critical Habitat

Critical habitat designation ensures that any USFWS authorized action on that land is not likely to result in destruction or adverse modification of that habitat. Critical habitat was designated for 41 plants on the Island of Hawaii in 2003.

Army lands were excluded from critical habitat based upon a rationale that recognizes and emphasizes the essential contribution that Army-led natural resource conservation actions play in the recovery of threatened and endangered species. These contributions include ongoing and proposed management actions specified in Integrated Natural Resource Management Plans (INRMPs) and other natural resource conservation programs. The INRMPs for Army installations on the islands of Oahu and Hawaii complement and support recovery goals through monitoring, invasive species control, and endangered species management, thereby providing conservation benefits to listed species.

There are presently four noncontiguous specially managed vegetation areas on PTA. These areas were designated as such because of their botanical composition or rare species potential habitat. Areas additional to these are fenced units protecting individuals or populations of rare plants. In addition, there are Botanically Significant Areas within the Region of Influence (ROI) of the proposed action outside of Army installation boundaries in the West PTA Acquisition Area (Palmer 2003).

Palila critical habitat was first designated in 1977 when the USFWS dedicated 60,187 acres (24,357 hectares) for their protection (USFWS 1977a and 1977b). There are 2,569 acres (1,040 hectares) of this habitat are in two noncontiguous areas on PTA (Figure 8-36). The vegetation of critical habitat area A, adjacent to the BAAF, is mostly *Dodonaea* shrubland, with *Eragrostis atropoides*, māmane (*Sophora chrysophylla*), and naio (*Myoporum sandwicense*). There are no firing points in this area. Critical habitat area B is mainly māmane and naio open forest, *sophora myoporum* shrubland with grass understory, and contains 11 firing points (USARHAW and 25<sup>th</sup> ID[L] 2001b). There is no plant critical habitat designated within the ROI.

#### Hawaiian Islands Humpback whale National Marine Sanctuary

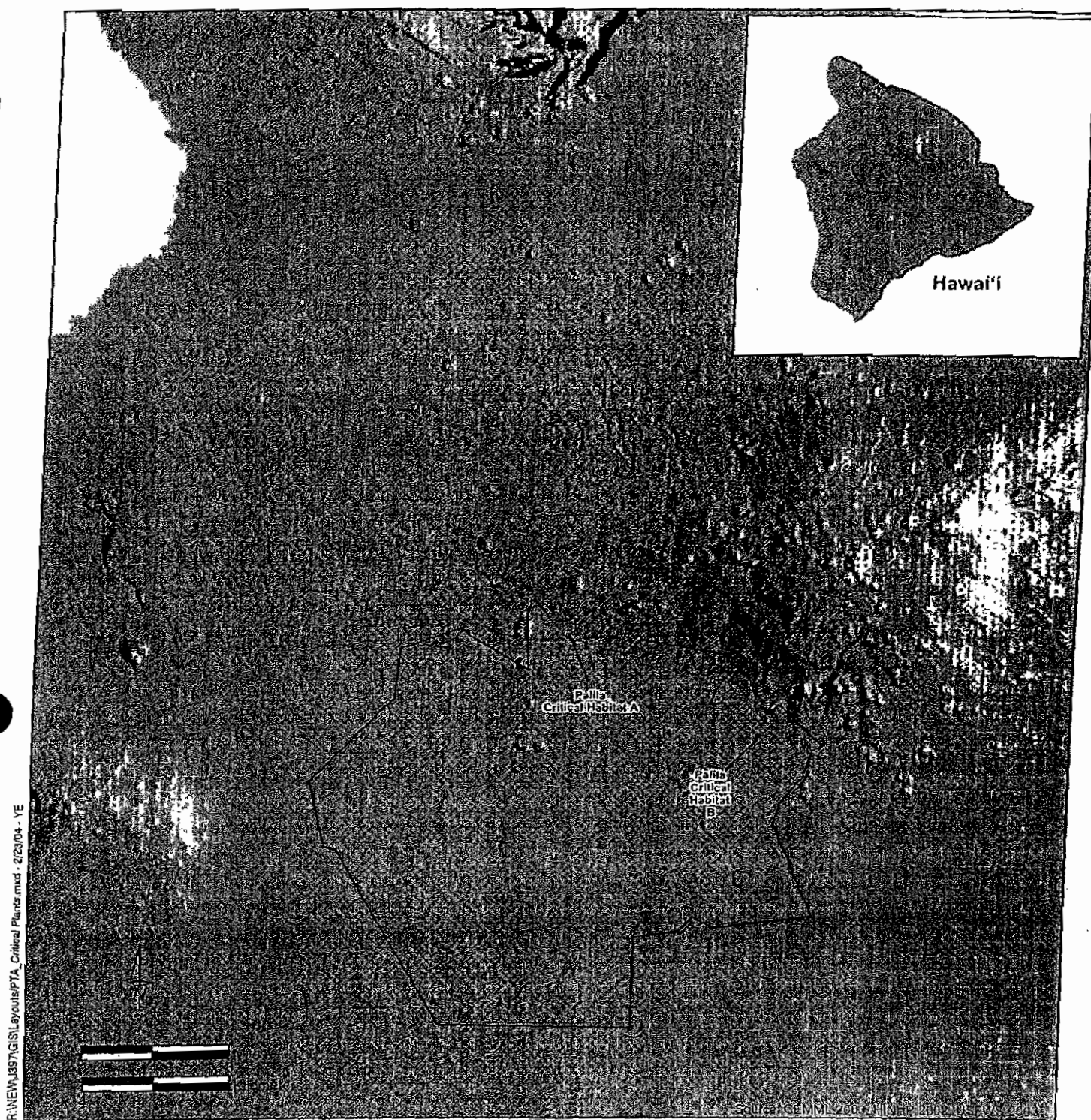
The Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) was designated under the National Marine Sanctuaries Act (16 U.S.C. 1431 et seq., P.L. 106-513). This act was enacted to designate and manage areas of the marine environment with special national significance as National Marine Sanctuaries. The primary objective of this law is to protect marine resources. The Act also directs the Secretary of Commerce to facilitate all public and private uses of those resources that are compatible with the primary objective of resource protection. Sanctuaries are managed according to site-specific Management Plans prepared by the NOAA Fisheries. HIHWNMS waters are composed of five separate areas abutting six of the major islands. Designated sanctuary waters encompass the entire western portion of the island of Hawai'i and include waters just outside and surrounding Kawaihae Harbor (see Figure 3-13).

#### Biologically Significant Areas

The Hawai'i Natural Heritage Program has defined three types of BSAs for managing important natural communities (Figure 8-37). Areas outside of PTA proper but within the ROI, such as PTA Trail and Kawaihae Harbor, have not been evaluated for BSA status.

BSA1 contains a high density of federally listed endangered, proposed endangered, or candidate species; approximately 11,618 acres (4,702 hectares) within PTA proper is designated as BSA1. This includes a portion of Kipuka Kalamauna endangered plants habitat and Pu'u Kapele, which is the site of a large population of *Haplostachys haplostachya* (USARHAW and 25<sup>th</sup> ID[TJ] 2001b).








There are 2,569 acres of Palila critical habitat within the Pōhakuloa Training Area Region of Influence.

# ***Federally Designated Palila Critical Habitat in the Pōhakuloa Training Area Terrestrial Biological Region of Influence***

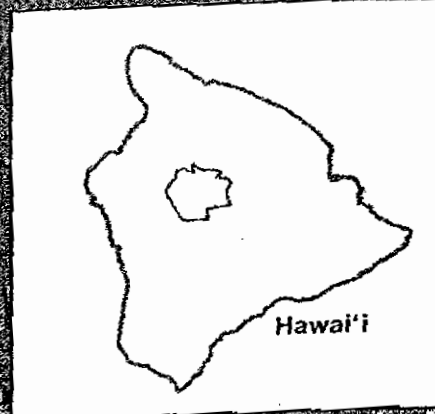
## **Legend**

-  Pōhakuloa Training Area Boundary
-  Region of Influence
-  Federally Designated Palila Critical Habitat

Island of Hawai'i, Hawai'i




**Figure 8-36**





21,860 acres of Biologically Significant Areas  
occur within the Pōhakuloa Training Area  
Terrestrial Region of Influence

**Legend**

-  Pōhakuloa Training Area Boundary
-  Region of Influence
-  Biologically Significant Areas

**Biologically Significant Areas found in the  
Pōhakuloa Training Area  
Terrestrial Region of Influence**

Island of Hawai'i, Hawai'i

**Figure 8-37**

8-159

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BSA2 contains all or some of the following: lower densities of current occurrences of federally listed endangered or proposed endangered species, current occurrences of candidate species or other species of concern that are expected to be upgraded to federally protected status within the next few years, and areas judged likely to contain high densities of federally listed species based on habitat assessment, despite the lack of any record of such occurrence to date. Approximately 20,909 acres (8,462 hectares) of BSA2 are identified in PTA proper.

BSA3 is stands of intact native vegetation, with few known occurrences of rare elements. These areas are valuable for their remnant natural vegetation and the potential to support reintroduced special status species. BSA3 areas make up a large portion of PTA, including a large portion of central and southern PTA. There are 45,841 acres (18,551 hectares) of BSA3 occurring within PTA proper.

#### 8.10.2 Environmental Consequences

In response to the agency and public comments received during the Draft EIS comment period we reevaluated our analysis of the biological resources. As a result of considering these comments and a reanalysis of the available information, we recognize that the impact to biological resources from fire could not be mitigated to the less than significant level. However, these impacts will be substantially reduced as a result of mitigation.

##### *Summary of Impacts*

Biological resources that have been considered include vegetation communities, wildlife, sensitive species, and sensitive habitats. All biological resources have been assessed for potential impacts from project activities. Significant impacts have been identified from fire and from construction and training activities, both of which would occur to sensitive species and habitat. Significant impacts mitigable to less than significant have been identified for impacts from the spread of nonnative species from construction and troop movements on sensitive species and sensitive habitat. Less than significant impacts have been identified from construction and training on general vegetation and wildlife, for migratory birds from the FTI construction, from noise and visual effects from construction and other project activities on wildlife, from vessel transport on marine wildlife and habitat, and runoff impacts on marine wildlife and coral ecosystems. For a full description of the impact methodology used to determine impact on a resource please refer to chapter 4.10. Only the resources potentially affected are included in this chapter. If a resource was determined not to be impacted, it has not been included for discussion. A summary of significant and less than significant impacts is provided in Table 8-22.

##### *Proposed Action (Preferred Alternative)*

Implementing the Proposed Action would increase the amount of land used for training ranges and maneuver lands, which would directly and indirectly impact biological resources.

##### *Significant Impacts*

*Impact 1: Impacts from fire on sensitive species and sensitive habitat.* Wildfire is a great threat to flora and fauna communities at PTA. An increase in construction and training at PTA would increase the likelihood of wildfires, which can spread rapidly and affect areas outside of the initial ignition area.

Table 8-22  
Summary of Potential Biological Impacts at PTA

Impact Issues	Proposed Action	Reduced Land Acquisition	No Action
Impacts from fire on sensitive species and sensitive habitat.	⊗	⊗	⊗
Impacts from construction and training activities on sensitive species and sensitive habitat.	⊗	⊗	⊖
Impacts from the spread of nonnative species on sensitive species and sensitive habitat.	⊖	⊖	⊖
Impacts from construction and training activities on general habitat and wildlife.	⊙	⊙	⊙
Threat to migratory birds.	⊙	⊙	⊙
Noise and visual impacts.	⊙	⊙	⊙
Vessel impacts on marine wildlife and habitat.	⊙	⊙	⊙
Runoff impacts on marine wildlife and coral ecosystems.	⊙	⊙	⊙

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

**LEGEND:**

- |  |                       |
|--|-----------------------|
| ⊗ = Significant  | + = Beneficial impact |
| ⊖ = Significant but mitigable to less than significant | N/A = Not applicable  |
| ⊙ = Less than significant                              |                       |
| ○ = No impact  |                       |

The use of various types of ammunition, weapon systems, and pyrotechnics during military training increases the risk of wildfire ignition. Proposed actions that could ignite fires include the use of BAX and the AALFTR. Fire sources associated with the proposed SBCT actions are discussed in detail in Chapter 8, Section 8.12, under fire hazards.

Federally listed species are known to occur within the immediate areas of the proposed ranges and in various areas throughout PTA and the WPAA (see Tables 8-20 and 8-21). Vegetation communities of PTA generally consist of montane dry forest and shrubland and subalpine dry forest and shrubland, all dominated by native species, while the WPAA is dominated by nonnative grasses and shrubs. BSAs that occur within the ROI and that would be affected by fire are presented in Figure 8-37. Species that occur within the surface danger zones of the proposed ranges could be affected by munitions during the operation of the proposed ranges. In addition to vegetation loss, major adverse ecological effects of wildland fires include reduced watershed stability, soil erosion, increased risk of weed invasion, and loss of native habitat. Increased fire frequency would affect the structure, composition, and function of ecosystems. An additional detrimental effect from fire is damage of and disturbance to native seedbeds. Though some native plants do show a degree of tolerance to fire and an ability to establish seedlings in a post-fire environment, these species are still not



as vigorous as the nonnative colonizers with which they compete. The spread of nonnative species that results from wildfires is considered a significant impact because nonnative species often out-compete native species and destroy native communities, as addressed in Impact 3. Impacts from fire on sensitive species including federally listed species are expected to be significant. The mitigation measures below will substantially reduce the impacts but not to less than significant levels.

Regulatory and Administrative Mitigation 1. The effects of the proposed action on listed species in the ROI have been evaluated in the ESA Section 7 Consultation with USFWS. The Army will implement all the terms and conditions defined in the Biological Opinion issued by USFWS for current force and SBCT proposed actions on the island of Hawai'i, including the PTA Implementation Plan. These measures will help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action. The Biological Opinion is available upon request.

The Integrated Wildland Fire Management Plan for Pohakuloa and Oahu Training Areas was updated on October 2003. The Army will fully implement this plan for all existing and new training areas to reduce the impacts associated with wildland fires. The plan is available upon request.

Prescribed burns will require separate ESA Section 7 consultation with USFWS.

Impact 2: Impacts from construction and training activities on sensitive species and sensitive habitat. The Proposed Action would result in short- and long-term impacts on listed species and their designated critical habitat within the ROI as a result of construction and increases and changes to training. Listed species affected by the Proposed Action include the following species:

- Plants: *Asplenium fragile* var. *insulare*, *Festuca hawaiiensis*, *Haplostachys haplostachya*, *Hedyotis coriacea*, *Hesperocnide sandwicensis*, *Isodendron hosakae*, *Lipochaeta venosa*, *Nerandia ovata*, *Portulaca sclerocarpa*, *Silene hawaiiensis*, *S. lanceolata*, *Solanum incompletum*, *Spermolepis hawaiiensis*, *Stenogyne angustifolia*, *Tetramolopium arenarium* var. *arenarium*, *T. consaguinium* ssp. *leptophyllum* var. *leptophyllum*, *Vigna o-wahuensis*, and *Zanthoxylum hawaiiense*.
- Wildlife: *Branta sandwicensis*, *Buteo solitarius*, *Hemignathus munroi*, and the palila (*Loxioides bailleui*).

The latest designation for plant critical habitat on the Island of Hawai'i excluded Army training lands however, federally listed plant species do occur in populations on the Army training lands. Within the ROI one wildlife species, the palila, has critical habitat. Proposed activities border on the palila designated critical habitat (Figure 8-36) in the ROI. There are 2,569 acres of palila critical habitat within the ROI. The Army is responsible for maintaining this habitat in a condition suitable for the palila and, by doing so, contribute to the recovery of the species.

Construction activity and increased training would have adverse impacts on the habitat, deterring the recovery of the species. Battle Area Complex construction, for example, will destroy the easternmost population of *Haplostachys haplostachya*, significantly reducing the distribution of this species. Populations of *Silene hawaiiensis* are known from the footprints of the BAX and AALFTR, and up to 20 percent of the total number of existing plants of this species could be adversely affected by construction. One individual representing less than one percent of the total population of *Zanthoxylum hawaiiense* occurs in the BAX project area and would likely be affected by construction. Construction activities would also increase the spread of nonnative species (Impact 3).

There would be a limited short-term impact on critical habitat from construction of the FTI, the Range Maintenance Facility, and the BAAP runway upgrade/extension. Construction-related dust, noise, the spread of nonnative species (discussed in Impact 3), and increased fire hazard would adversely impact palila federally designated critical habitat. Long-term impacts on listed species and their critical habitat include habitat degradation and reduction from increased human activity, spread of nonnative species due to habitat disturbance, and the higher risk of people bringing nonnative species to the area on their clothing, equipment, or vehicles. The habitat degradation caused by vegetation trampling, erosion, and an increase in the visual presence of Soldiers in and around the critical habitat would damage plant habitat and deter wildlife use of the area. Stryker maneuvers in these areas are likely to adversely affect populations of *Stenogyne angustifolia* and *Vigna o-wahuensis*.

Changes to dismounted training would include activities in TA 23, while avoiding the 1,500 acres (607 hectares) around the MPRC. Troops would be transported to TA 23 by either Strykers or trucks using existing roads. Soldiers would begin dismounted training in tactical formations by walking in dispersed groups overland, toward a given objective. During simulated engagement some Soldiers may use ammunition consisting of blanks and laser weapons and seek concealment or cover during nonlive-fire training. Soldiers could trample listed plant species identified in the area, including *Silene hawaiiensis*, *Asplenium fragile* var. *insulare*, *Hedyotis coriacea*, *Silene lanceolata*, *Spermolepis hawaiiensis*, and *Zanthoxylum hawaiiense* (Figure 8-34). Listed wildlife, such as the nene, have been recorded in the proximity of TA 23 (Figure 8-35) and would be disturbed by noise of approaching Strykers, nonlive fire, and the increase in human presence in the area.

A moderate to large portion of vegetation within the construction footprints (approximately 10 to 30 percent) would be affected during construction of the proposed ranges. Native mammals and birds capable of escaping the area would be expected to vacate during construction and less mobile creatures, such as small mammals (nonnative) and invertebrates, could be killed during or as a result of construction of the proposed projects. Table 8-23 indicates the area of disturbance during construction of proposed ranges. Grading during construction would involve turning up the ground, moving topsoil and vegetation, and staging the heavy machinery area, would cause intensive short-term disturbance to vegetation. This represents a significant impact on native vegetation communities. Listed plant and wildlife are known to exist in the PTA ROI and would be affected by the loss and degradation of the PTA ROI (Tables 8-20 and 8-21).

Table 8-23  
Construction Impacts on Vegetation of Proposed Ranges

Proposed Range	Area of Construction Impact (approximate acres)	Existing Vegetation Communities (not including the surface danger zone)
Battle Area Complex	600 (243 hectares)	<i>Myoporum</i> dominated tree and shrublands, <i>Metrosideros</i> treelands, <i>Sophora</i> shrublands, <i>Pennisetum</i> grasslands, and barren lava
Anti-Armor Live Fire Range	75 (30.3 hectares)	Barren lava, <i>Metrosideros</i> treelands, <i>Sophora</i> shrublands, and <i>Myoporum</i> dominated tree and shrublands

Source: Developed as part of ESA Section 7 consultation.

Off-road mounted maneuver would occur on approximately 31,230 acres (12,675 hectares) at PTA, primarily in the WPAA (Figure 2-6). Use of PTA Trail and the WPAA would increase the stress on the environment. The impact of all vehicle use in the PTA ROI is estimated at 92,794 MIMs as compared to the 13,659 MIMs based on all current vehicles. Long-term loss and degradation include the loss of open space areas in and around the areas proposed for project construction and in the WPAA where extensive off-road dismounted maneuver is proposed. A direct loss of habitat would be associated with the construction of PTA Trail. Sections of PTA trail would cross biologically sensitive areas with stands of intact, relatively common native vegetation types. Part of the reason that these communities still exist is their remote location. Opening this area up to the more direct effects of humans threatens these communities and their diversity. Hawaiian plant communities evolved without the environmental pressures that are prevalent on major landmasses and thus have no defense mechanisms to cope with these stresses. Fragmenting these sensitive communities interrupts corridors for species to naturally disperse, encourages the spread of nonnative plants, and limits the potential for nonnative species-dominated areas to be reclaimed to reintroduce native species.

Training restrictions on palila critical habitat, established based on ESA Section 7 consultation that occurred after the designation of critical habitat in 1977 (USARHAW and 25<sup>th</sup> ID[L] 2001b), would continue to apply to activities under the Proposed Action. Additional potential impacts such as the effects of increased noise in this area were investigated along with the effects on palila as a part of the most recent (2003) ESA Section 7 consultation. The increased likelihood of training-related fires and the increase in extent and intensity of such a fire is also a threat to this species and is discussed in detail in Impact 1. No off-road mounted maneuvers would be allowed in the critical habitat.

The Proposed Action would significantly impact sensitive species and sensitive habitat from construction and training activities. The mitigation measures below would substantially reduce the impacts but not to less than significant levels.

Regulatory and Administrative Mitigation 2. The Army will implement all the terms and conditions defined in the Biological Opinion issued by USFWS for current force and SBCT proposed actions on the island of Hawai'i, including the PTA Implementation Plan. These measures will help avoid effects and compensate for impacts on listed species that would



## 8.10 Biological Resources

result directly and indirectly from implementation of the proposed action. The Biological Opinion is available upon request. Some of the terms and conditions of the BO include:

- If a construction site is within 75 meters (246 feet) of a listed plant occurrence, then construction grading or earth moving operations shall be sprayed with water to reduce airborne dust.
- The Army will maintain a minimum of 12 percent ground cover in off-road maneuver areas on PTA.

The Army will implement land management practices and procedures described in the ITAM annual work plan to reduce erosion impacts (US Army Hawai'i 2001a). Currently these measures include: implementation of a training requirement integration (TRI) program; implementation of an Integrated Training Area Management (ITAM) program; Sustainable Range Awareness (SRA) program; development and enforcement of range regulations; implementation of an Erosion and Sediment Control Management Plan; coordinating with other participants in the Koolau Mountains Watershed Partnership (KMWP); and continued implementation of land rehabilitation projects, as needed, within the Land Rehabilitation and Maintenance (LRAM) program. Examples of current LRAM activities at KTA include: revegetation projects involving site preparation, liming, fertilization, seeding or hydroseeding, planting trees, irrigation, and mulching; a combat trail maintenance program (CTP); coordination through the Troop Construction Coordination Committee (TCCC) on road maintenance projects; and development of mapping and GIS tools for identifying and tracking progress of mitigation measures.

Regulatory and Administrative mitigation measures identified in Section 8.8, Water Resources and Section 8.9, Geology, Soils, and Seismicity, would lessen this impact on sensitive species and habitat.

*Additional Mitigation 2:* The Army proposes to fence or flag where practicable any sensitive plant communities from activities that may take place in the ROI. The Biological Opinions outline fencing for the majority of the sensitive species. USARHAW will evaluate if additional fencing may be necessary.

Significant Impacts Mitigable to Less than Significant

Impact 3: Impact from the spread of nonnative species on sensitive species and sensitive habitat. The Proposed Action would lead to an increase in nonnative species for the short and long term in the PTA ROI. In general, nonnative species (both plant and animal) pose a threat to Hawaiian native ecosystems (Atlas 1998).

Introduction or spread of existing or new aggressive nonnative plant species can alter native plant habitat and create competition with native and sensitive plants for space, nutrients, and light (Atlas 1998). Invasive plants have an advantage in becoming established in an environment that is stressed and can often out-compete native species that are not adapted to the novel environment created through human activity (Wagner et. al. 1999). Nonnative species often benefit from fires, due to their ability to colonize areas following a burn. In

additional 20,000 acres (8,094 hectares) (Reinman and Schilz 1999). This resulted in the discovery of 48 new sites.

On the east side of PTA, surveys were not initiated until 1993, when BioSystems Analysis conducted an aerial and pedestrian inventory survey of 6,700 acres along both sides of Redleg Trail (Reinman and Pantaleo 1998b). Following this work, Ogden surveyed four areas east of Redleg Trail totaling about 970 acres (393 hectares) (Williams et al. 2002). Later, an additional area of 2,640 acres (1,068 hectares) to the east of the trail was surveyed and Phase II surface collection and testing conducted of sites in areas previously surveyed (Williams 2002 a and b). In an area with an expected low density of sites, 67 sites and over 1,800 excavated pits were recorded.

Areas that will be directly affected by the Proposed Action were surveyed in 2002 and 2003. Many of the sites are now being formally evaluated.

### ***Known Prehistoric and Historic Resources***

#### ***Pōhakuloa Training Area***

In general, archaeological resources at PTA consist of modified natural features, such as lava tubes, lava shelters, and lava blisters. A 1998 review of previous archaeological studies concluded that lava tubes made up 70 percent of all recorded sites at PTA (Eidsness et al. 1998, 31), and they remain one of the most common site types found in more recent surveys. Other site types include cairn sites, trails, volcanic glass quarries, excavated pits, and lithic workshops. Within these sites, material remains include grinding tools, charred wooden torches, gourds, cordage and matting, woven ti leaf sandals, kukui nuts, 'opihi shells, and other faunal remains. Surface features include stone-lined hearths, cupboards, rock-paved areas, low walls and platforms, rock-filled crevices, ramps, cairns, shrines, open-air shelters, and trails. The region has much value for archaeological research and has produced important information concerning bird hunting, trail systems, and short-term living conditions at higher elevations.

Reinman et al. (1998a) claim the cultural resources at PTA are important for addressing issues about Hawaiian prehistory and history in the uplands region, as well as the development of Native Hawaiian society.

The existence of approximately seven stone shrines attest to the likely ritual activity that went on at PTA. With prayers and ritual permeating traditional Hawaiian life, some of the structures at PTA may be occupational shrines (Buck 1957, 259, cited in McEldowney 1982, 1.10). Cairns (ahu) have been recorded at various terrains, either associated with trail systems or boundary markers, or as just isolated features. There appears to be no pattern to the distribution of cairns across the PTA landscape, and they have been quantified as representing between 10 and 15 percent of known sites. Cairns have also been constructed for military purposes, although the trained eye can usually differentiate military cairns from prehistoric ones. It is also possible that some cairns were constructed for rituals.

### Archaeological Resources

PTA is rich with archaeological resources, with 291 reported archaeological sites, including both prehistoric and historic Native Hawaiian sites and historic military structures (Tables 8-24 and 8-25). The only site listed on the NRHP is the Bobcat Trail Habitation Cave (Site 50-10-30-5004). Figure 8-38 shows archaeological sensitivity areas at PTA.

Most relevant to the Proposed Action are the archaeological sites found during surveys along Redleg Trail and areas to the east. The BAX and AALFTR projects are located on the west side of Redleg Trail, and the survey conducted by BioSystems Analysis included portions of the two project areas. One site was identified within the boundaries for the BAX, Site 19490, and one within the boundaries for the AALFTR, Site 18673 (Reinman and Pantaleo 1998b). The survey also identified one site, Site 18671, a small lava tube containing cultural features and material, east of Redleg Trail just outside the AALFTR. The northernmost part of the Redleg Trail survey area lay to the east of the BAX. Site 21495, a complex of excavated pits, and Site 21671, a complex of scattered chill glass quarry locations, were located on the east side of Redleg Trail near the BAX boundary (Williams 2002 a and b). One of the four areas surveyed to the south, Survey Area III, is located across Redleg Trail immediately east of the AALFTR boundary. However, all sites recorded in this area lie in the eastern portion of the survey area well outside the AALFTR (Williams et al. 2002).

Table 8-24  
Summary of Known Cultural Resources at PTA and WPAA

	Total Archaeological Sites	Sites Listed, Eligible, or needing DE	Area Surveyed for Archaeological Sites	Potential Historic Structures	Buildings Listed, Eligible, or Needing DE
PTA	291	291 (220 DE)	33,500 acres (13,557 hectares)	138	0
WPAA	96	95 (DE)	All 23,000 acres	2	2 (DE)
PTA Trail	6	6 (DE)	Unknown	0	0

Source: IARII 2003; Roberts et al. 2003

Notes: "DE" means a site or building that has not yet been found ineligible for the NRHP and therefore must be treated as eligible pending such a finding.

GANDA conducted a recent survey of the entire proposed area for the AALFTR that revealed the presence of 21 lava tube caves, five of which were found to contain cultural materials (Table 8-26) (Roberts et al. 2003; IARII 2003; GANDA 2002a). One of these had been identified during earlier surveys. All five lava tubes contained evidence of their use as shelters or temporary habitation areas, but in one site three upright stones were found on basalt ledges, suggesting that these may have been shrines. Two complexes of excavated pits and a lithic scatter representing a workshop area were also found during the survey. A total of eight archaeological sites are located in the AALFTR.



Table 8-25  
Archaeological Sites Recommended as Eligible to the NRHP at PTA

State Site Number 50-10-31-	Site Type	Site Function
05000	Lava Tube	Shelter
05001	Lava tube	Shelter
05002	Wall	Ranching
05003	Lava tube	Shelter/habitation
05004	Lava tube	Shelter/habitation/religious
05005	Lava tube	Shelter/habitation/religious
05006	Trail	Transportation
05007	Trail	Transportation
05008	Trail	Transportation
05009	Trail	Transportation
07119	Wall	Ranching
10220	Lava tube	Shelter/habitation
10221	Lava tube	Shelter/habitation
10222	Lava tube	Shelter/habitation
10265	Lava tube	Shelter/habitation
10266	Lava tube	Resource procurement
10267	Lava tube	Shelter/habitation
10268	Lava tube	Resource procurement
10269	Lava tube	Shelter/habitation
10270	Lava tube	Water procurement
10271	Lava tube	Resource procurement
10271	Ahu	marker
10272	Overhang shelter	Shelter
10644	Lava tube	Shelter
10645	Lava tube	Shelter
10646	Lava tube	Shelter
10647	Lava tube	Shelter
10648	Lava tube	Shelter
10649	Lava tube	Shelter
10650	Lava tube	Shelter
10651	Lava tube	Shelter
10652	Lava tube	Shelter
10653	Lava tube	Shelter
10654	Lava tube	Shelter

**Table 8-25**  
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

State Site Number 50-10-31-	Site Type	Site Function
10655	Lava tube	Shelter
10656	Lava tube	Shelter
10657	Lava tube blister	Shelter
10658	Lava tube	Resource procurement
14638	Site-complex (enclosures, lava tube blisters, wall, C-shape, lithic scatter, overhang shelter	Lithic workshop, resource (lithic) Procurement/shelter/workshop/trail?
17116	Lava tube	Shelter/habitation
17117	Ahu	Marker
17118	Ahu	Marker
17119	Ahu complex	Unknown
17120	Ahu	Marker
17121	Ahu	Marker
17122	Ahu	Marker
17123	Ahu	Marker
17124	Ahu	Marker
17125	Lava tube	Resource procurement
17126	Overhang shelter	Shelter
17127	Overhang shelter	Shelter
17128	Overhang shelter	Shelter
17129	Overhang shelter	Shelter
17130	Ahu	marker
17131	Overhang shelter	Shelter
17132	Overhang shelter	Shelter
17133	Overhang shelter	Shelter
17134	Overhang Shelter	Shelter
17135	Overhang shelter	Shelter
17136	Lava Tube blister	Shelter
17137	Quarry	Resource procurement
17138	Ahu complex	Unknown
17139	Lava tube	Shelter/historic butchering site
17140	Ahu	Marker
17142	Ahu	Marker
17143	Quarry	Resource procurement
17144	Overhang shelters	Shelter
17145	overhang shelter	Shelter



Table 8-25  
Archaeological Sites Recommended as Eligible to the NRHP at PTA (continued)

State Site Number 50-10-31-	Site Type	Site Function
17147	Ahu	Marker
17148	Overhang shelter	Shelter
17149	Overhang shelter	Shelter
17150	Lava tube	Shelter/habitation
17151	Lava tube	Shelter/habitation
17153	Ahu	Marker
17154	Overhang shelter	Shelter
17155	Lava tube	Shelter (historic)
17156	Lava tube	Resource procurement/religious
17157	Overhang shelter	Shelter
17158	Lava tube	Shelter
17159	Ahu	Marker
17160	Quarry	Resource procurement
17161	Overhang shelter	Shelter
17162	Quarry	Resource procurement
17163	Lava tube	Historic shelter
17164	Quarry	Resource procurement
17165	Quarry	Resource procurement
17166	Quarry	Resource procurement
18671	Lava tube	Shelter/habitation
18672	Lava tube	Shelter/habitation
18673	Lava tube	Shelter/habitation/religious
18674	Shrine	Religious
18675	Quarry	Resource procurement
18676	Shrine	Religious
18677	Site complex	Religious
18678	Platform	Religious
18679	Trail	Transportation
18680	C-shape	Shelter
19490	Lava tube, C-shape, trail	Shelter/habitation/transportation
19491	Lava tube	Sandalwood resource procurement
19492	Lava tube	Shelter/resource procurement
19493	Overhang shelter	Shelter
19494	Overhang shelter	Shelter
19495	Lava tube	Shelter/habitation
19496	Lava tube	Water procurement
19497	Lava tube	Shelter/habitation

**Table 8-25**  
**Archaeological Sites Recommended as Eligible to the NRHP at PTA (continued)**

State Site Number 50-10-31-	Site Type	Site Function
19498	Lava tube blister	Shelter
19499	Lava tube	Shelter/habitation/resource procurement
19500	Lava tube	Shelter
19501	Lava tube	Shelter/habitation/water and resource procurement
19502	Lava tube	Water procurement
19503	Lava tube	Shelter
19504	Lava tube	Water procurement
19505	Lava tube	Shelter/resource procurement
19506	Lava tube	Shelter/water procurement
19507	Overhang shelter	Shelter
19508	Lava tube	Water procurement
19509	Lava tube	Water procurement
19510	Quarry	Resource procurement
19511	Lava tube	Water procurement
19512	Lava tube	Shelter
19513	Lava tube	Shelter/water procurement
19514	Lava tube	Shelter/habitation/resource procurement
19515	Lava tube	Shelter/habitation/resource procurement
19516	Lava tube	Water procurement
19517	Lava tube	Water procurement
19518	Lava tube	Shelter/habitation
19519	Lava tube	Resource procurement
19520	Lava tube	Shelter
19521	Lava tube	Shelter
19522	Lava tube	Shelter
19523	Lava tube	Shelter/habitation/resource procurement
19524	Lava tube	Shelter
19525	Lava tube	Shelter
19526	Lava tube	Shelter
19527	Lava Tube	Resource procurement
19528	<u>Na Ohule Elua Trail</u>	Transportation
19529	Lava tube	Shelter/habitation
21164	Lava tube	Shelter/habitation
21165	Lava tube	Shelter/habitation
21166	Lava tube	Shelter/habitation
21167	Quarry	Resource procurement



Table 8-25  
Archaeological Sites Recommended as Eligible to the NRHP at PTA (continued)

State Site Number 50-10-31-	Site Type	Site Function
21168	Ahu	Marker
21169	C-shape	Shelter
21170	Ahu	Marker
21171	Trail	Transportation
21172	Trail	Transportation
21281	Lava tube	Shelter/habitation
21282	Lava tube	Shelter/habitation
21283	Site complex, lava tube	Shelter/habitation/resource procurement
21284	Ahu complex	Unknown
21285	Lava tube	Shelter/habitation
21286	Lava tube	Shelter/habitation
21287	Lava tube	Shelter/habitation
21288	Ahu complex	Marker, unknown
21289	Shrine	Religious
21290	Shrine	Religious
21291	Lava tube	Shelter/habitation
21292	Lava tube	Shelter/habitation
21293	C-shape	Shelter
21294	Lava tube	Shelter/habitation
21295	Lava tube	Shelter/habitation
21296	Lava tube	Shelter/habitation
21297	Lava tube	Shelter/habitation
21298	Ahu complex	Marker, unknown
21300	Excavated pit	Unknown
21301	Pavement	Unknown
21302	Ahu, petroglyph	Marker, unknown
21303	Lava tube	Shelter/habitation
21304	Quarry	Resource procurement
21305	Lava tube	Shelter/habitation
21306	C-shape	Shelter
21307	Ahu	Marker
21308	C-shape	Shelter
21309	Lava tube	Shelter/habitation
21310	Ahu	Marker
21311	Ahu, platform	Marker, religious
21312	Lava tube	Shelter/habitation
21313	Pits, area I	Unknown

**Table 8-25**  
**Archaeological Sites Recommended as Eligible to the NRHP at PTA** *(continued)*

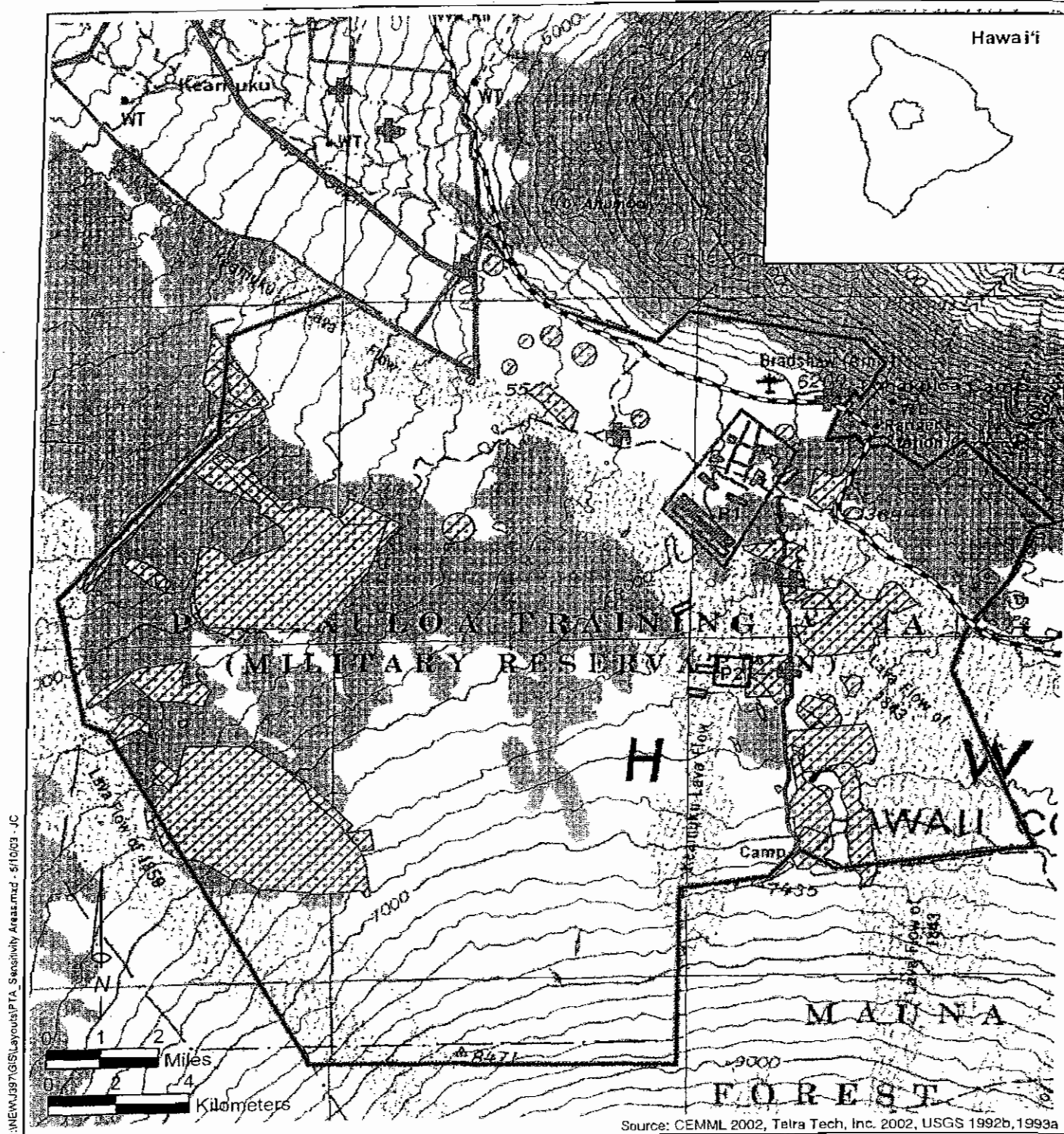
State Site Number 50-10-31-	Site Type	Site Function
21314	Pits, area II	Unknown
21315	Pits, area III	Unknown
21316	Pits, area IV	Unknown
21351	Site complex	Workshop
21483	Lava tube	Shelter/habitation
21484	Lava tube	Shelter/habitation
21485	Lava tube	Shelter/habitation
21486	Lava tube	Shelter/habitation
21487	Lava tube	Shelter/habitation
21488	Lava tube	Shelter/habitation
21489	Lava tube	Shelter/habitation
21490	Lava tube	Shelter/habitation
21491	Lava tube	Shelter/habitation
21492	Lava tube	Shelter/habitation
21493	Quarry, excavated pit	Resource procurement, unknown
21494	Lava tube	Shelter/habitation
21495	Site complex	Unknown
21496	Lava tube	Shelter/habitation
21497	Lava tube	Shelter/habitation
21498	Lava tube	Shelter/habitation
21499	Ahu complex	Unknown
21500	Ahu complex	Unknown
21501	Lava tube	Shelter/habitation
21502	Lava tube	Shelter/habitation
21503	Site complex	Religious
21665	Lava tube	Shelter/habitation
21666	Quarry	Resource procurement
21667	Quarry	Resource procurement
21668	Quarry	Resource procurement
21669	Quarry	Resource procurement
21670	Quarry	Resource procurement
21671	Quarry	Resource procurement
21672	Quarry	Resource procurement
21673	Quarry	Resource procurement
21674	Quarry	Resource procurement
21744	Lithic, pavement	Resource procurement, lithic workshop
21745	Lava tube	Shelter/habitation



Table 8-25  
Archaeological Sites Recommended as Eligible to the NRHP at PTA (continued)

State Site Number 50-10-31-	Site Type	Site Function
21746	Site complex	Unknown
21747	Lava tube	Shelter/habitation
21748	Excavated pit	Unknown
21749	Lava tube	Shelter/habitation
21750	Shrine	Religious
21807	Lava tube	Shelter/habitation
21809	Lava tube	Shelter/habitation
22941	Lava tube, lithic	Resource procurement
23450	Ahu	Marker
23451	Lava tube	Shelter
23452	Enclosure	Unknown
23453	Enclosure	Unknown
23454	Modified outcrop	Unknown
23455	Excavated pit complex	Resource procurement
23456	Enclosure	unknown
23457	Trail	Transportation
23458	Quarry	Resource procurement
23459	Enclosure	Shelter
23460	Lava tube/modified outcrop	Shelter
23461	Enclosure	Shelter
23462	Ahu	marker
23463	Excavated pit complex	Resource procurement
23464	Site-complex	Shelter/habitation
23465	Lithic scatter	Lithic workshop
23466	Lava tube	Shelter/habitation
23621	Excavated pit complex	unknown
23622	Excavated pit complex	unknown
23625	Lava tube	Shelter/habitation
23626	Lava tube	Shelter/habitation

Source: IARII 2003



## Archaeological Sensitivity Areas at Pōhakuloa Training Area

Island of Hawai'i, Hawai'i

**Figure 8-38**

8-191

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Table 8-26  
Archaeological Sites at PTA within the AALFTR and BAX

Site No. 50-10-31-*	Site Name/Type	Probable Function	Probable Age
18673	Lava tube system	Habitation ceremonial	Late prehistoric
21285	Lava tube cave	Shelter/ habitation	Prehistoric
21299	Lava tube cave	Shelter/ habitation	Prehistoric
21306	Lava tube cave	Shelter/ habitation	Prehistoric
23463	Excavated pit complex	Possible bird nesting	Prehistoric
23465	Lithic scatter	Lithic workshop	Prehistoric
23622	Excavated pit complex	Possible bird nesting	Prehistoric
23625	Lava tube cave	Shelter/ habitation	Prehistoric
19490	Site complex: 4 lava tubes, 2 trails, 1 C-shape, 4 ahu	Habitation transportation markers	Prehistoric /historic
23450	Rock mound	Marker	Prehistoric
23451	Lava tube	Shelter	Prehistoric
23452	Enclosure	Unknown	Unknown
23453	Rock mound	Unknown	Prehistoric
23454	Modified outcrop	Unknown	Prehistoric
23455	excavated pit complex	Resource procurement	Prehistoric
23456	Enclosure	Unknown	Prehistoric
23457	Trail	Transportation	Prehistoric
23458	Chill glass quarry	Resource procurement	Prehistoric
23459	Rock shelter	Shelter	Prehistoric
23460	Lava tube/ modified outcrop	Shelter	Prehistoric
23461	Rock shelter	Shelter	Prehistoric
23462	Ahu	Marker	Unknown
23464	Site complex: overhang shelter, enclosure, modified outcrop	Shelter/ habitation	Prehistoric
23621	Excavated pit complex	Unknown	Prehistoric
23626	Lava tube cave	Shelter/ habitation	Prehistoric

Sources: Roberts et al. 2003; IARII 2003

Seventeen sites have been found in the proposed area for the BAX, including excavated pit complexes, rock shelters, modified outcrops, rock mounds, a cairn, a lava tube, a lithic scatter, and an enclosure. One site, a complex of lava tubes, trails, enclosures, and a shrine had been identified prior to archaeological survey for the Proposed Action (Reinman and Pantaleo 1998b). The GANDA survey of the entire BAX area revealed the presence of an additional 16 sites (Roberts et al. 2003). Except for the ahu or cairns, whose age is uncertain, all features seem to be prehistoric in age. Table 8-26 lists the archaeological sites within these two project areas.



### Historic Structures and Military Landscapes

The cantonment area includes 138 structures, including Quonset huts that date from 1955 to 1958. The condition of all structures has been assessed, and they appear to be NRHP eligible. The Army has agreed to preserve some of them. Other associated structures within the cantonment area and BAAF and throughout the PTA have been evaluated for NRHP eligibility for either the World War II or Cold War eras. Although no structures have been determined as eligible, the Army has agreed to preserve some of the buildings. An MOA is in development covering treatment.

### PTA Trail

While Kawaihae Harbor has no archaeological sites, records indicate that the nearshore area contains an underwater shark heiau. The trail itself runs inland from the harbor and then turns south, paralleling the current highway. It passes John Young's house on the coastal side of the property and then turns inland again as it crosses the lands of Pu'u Koholā National Historic Park, between Young's homestead and the two heiau in the park. The Pu'u Koholā Heiau is associated with the founding of the Hawaiian kingdom. Built between 1790 and 1791 by Kamehameha I, it was constructed to incur the favor of the war god Kuka'ilimoku (National Park Service 2004).

Near the harbor to the north and east, there are other areas rich in archaeological site. additional sites have been located along the proposed alignment for PTA Trail as the trail approaches the installation (Table 8-27). Figure 8-39 shows archaeological sensitivity areas for PTA Trail and WPAA.

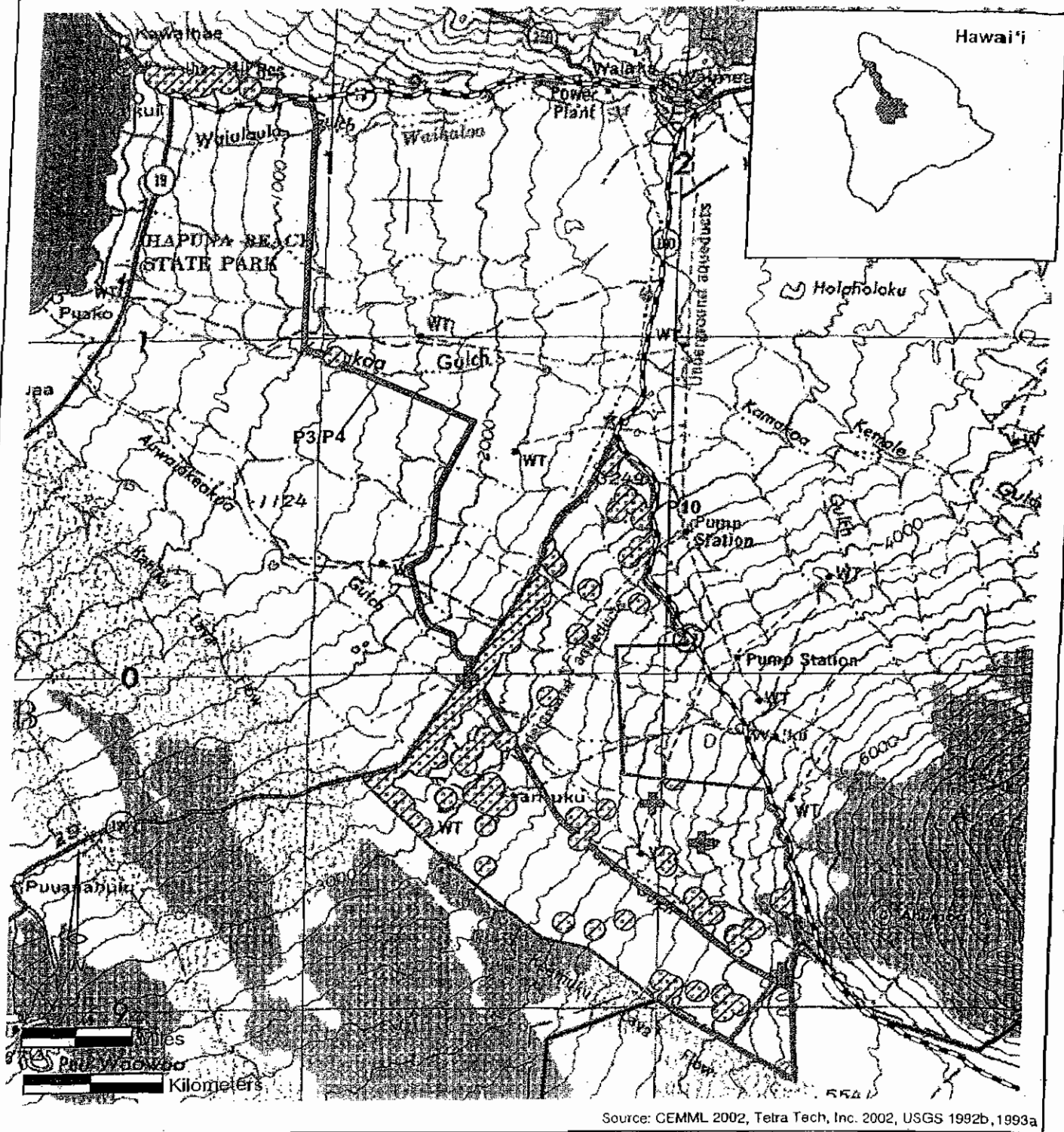
Table 8-27  
PTA Trail Archaeological Sites

Site Number	Site Type	Probable Function	Probable Age
50-10-05-9012	Wall	Cattle boundary	Historic
50-10-05-23601	Retaining wall	Cart road	Historic
50-10-05-23602	Mound	Marker	Historic
50-10-05-23623	Wall network	Cattle boundary	Historic
50-10-05-23624	Terrace	Possible habitation	Possibly prehistoric
None	Lava blister	Possible burial	Possibly prehistoric
None	Mound	Undetermined	Undetermined

Source: IARII 2003

GANDA surveyed a 98-foot- (30-meter-) wide corridor along the proposed trail, between Kawaihae Harbor and Māmalahoa Highway, and identified seven archaeological sites (Roberts et al 2003). Four sites are likely post-Contact or Historic in age. Two of these are segments of rock walls used as cattle enclosures or boundaries for Parker Ranch. One site is a stone mound possibly used as a trail marker. The fourth historic site, immediately inland from Kawaihae, consists of the remains of a .62-mile- (1-km-) long stretch of a cart road probably representing the main road built in the mid-1800s between Kawaihae and Waimea. Preserved features of the road include bridge foundations built of cobbles and boulders, milled lumber from the bridges with nails in place, stone retaining walls, and possible pahoehoe barrow pits from which construction material was obtained.

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## Archaeological Sensitivity Areas at West PTA and PTA Trail

Island of Hawai'i, Hawai'i

- Legend**
- Pōhakuloa Training Area Boundary
  - 1010 Land Purchase Area
  - P7 West Pōhakuloa Training Area Land Acquisition Area
  - Sensitive Areas
  - P10 Fixed Tactical Internet
  - P3/P4 Pōhakuloa to Kawaihae Trail
  - Saddle Road
  - Red Leg Trail

**Figure 8-39**

8-194

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Two possibly prehistoric sites include a lava blister, which might contain a burial, and a terrace that may have been used during the prehistoric period. No cultural materials were found in association with the prehistoric features during the survey. The seventh site recorded consists of a stone mound of undetermined age.

#### Potential Stryker Maneuver Areas

GANDA conducted a Phase I reconnaissance survey of approximately 9,000 acres for the SBCT Go-Areas at PTA (GANDA 2003d). The PTA Go-Areas include a portion or all of training areas 1, 2, 4, 6, 9, 12 to 16, 18, and 19. The survey was conducted between May 19 and July 11, 2003.

Twenty-two sites or site complexes were identified, including traditional Hawaiian sites: habitation complexes, rockshelters, pahoehoe pits, 'a'ā pit complexes, and a lithic scatter. One of the habitation complexes has a pictograph panel with six anthropomorphic figures, one Lono figure, one dog figure, and six linear figures. These are the first pictographs identified at PTA.

Also unusual were the 'a'ā pit complexes identified in the Go-Areas. The pits were excavated into the surrounding 'a'ā flow with the excavated material often piled around the perimeter of the pit forming a partial or complete enclosure. In some cases the 'a'ā pits were horizontally excavated into naturally occurring outcrops within the 'a'ā flow. Little to no soil occurs within the pits. The function of the pits is undetermined.

With the exception of the 'a'ā pits and the pictograph panel, all features and site types identified within the Go-Area are common to PTA and represent short-term occupation, resource exploitation, and lithic workshop.

#### West PTA Acquisition Area

The WPAA is west and north of PTA proper. Under the Proposed Action the Army would acquire approximately 23,000 acres (9,308 hectares) of fee-simple land from the Richard Smart Trust (Parker Ranch). The area is roughly triangular-shaped and lies between the west boundary of PTA, Māmalahoa Highway, and Saddle Road. The proposed land acquisition area surrounds the Waikī Ranch development on its north, west, and south sides. It is would be used as a force-on-force training area.

Prior to 2002, two archaeological surveys had been conducted of small portions of the WPAA. During survey of the Waikoloa Maneuver Area, Ogden conducted a limited survey within the WPAA and identified two sites, a rock shelter (Site 22929) near one crater and a dryland agricultural complex (Site 22933) within another crater (Robins et al. 2001). PHRI conducted survey of several proposed corridors for the Saddle Road through the area and identified five sites, although two historic sites adjacent to Saddle Road were considered not eligible to the NRHP and not described or given state site numbers. The other sites included a portion of the historic Old Waimea-Kona Belt road (Site 20855), the Ke'āmuku Sheep Station (Site 23529), and two enclosures (Site 20852) that were reported by an informant to be associated with a burial (Langlas et al. 1997). The exact location of the last site has not been disclosed, and it is not known if it is included among the sites later recorded in the area.



In 2002, GANDA surveyed the entire WPAA for archaeological resources. GANDA found 90 new sites and relocated four of the seven previously known sites; thus, a total of 97 sites have been identified in the area (Table 8-28). The sites include ahu, C-shaped stone mounds (one with bone fragments), an enclosed excavated pit, mounds, a mound complex (with over 20 mounds), rock piles, enclosures, an enclosed platform, wall sections, a wall-mound-terrace complex, and a petroglyph (IARII 2003). Military features were not recorded as sites. An ancient trail, the Hualalai-Waiki'i Trail, would have crossed the parcel, but no evidence of the trail was found during the surveys.

**Table 8-28**  
**PTA Go-Area Archaeological Sites**

<u>State Site # -</u>	<u>Site Type</u>	<u>Feature Types</u>
<u>50-10-31-23933</u>	<u>Multi-use complex</u>	<u>Enclosure, excavated 'a'a pits, wall, cairn</u>
<u>50-10-31-23934</u>	<u>'A'a pit complex</u>	<u>'A'a pits</u>
<u>50-10-31-23935</u>	<u>Repeated-use hab complex</u>	<u>Rockshelter, pictographs, wall, hearth, terrace, mod outcrops, lava tube, alignment and a cairn</u>
<u>50-10-31-23936</u>	<u>Limited-use hab complex</u>	<u>Enclosure, wall</u>
<u>50-10-31-23937</u>	<u>'A'a pit complex</u>	<u>'A'a pits</u>
<u>50-10-31-23938</u>	<u>Wall</u>	-
<u>50-10-31-23939</u>	<u>'A'a pit complex</u>	<u>'A'a pits</u>
<u>50-10-31-23940</u>	<u>Wall</u>	-
<u>50-10-31-23941</u>	<u>Ranching complex</u>	<u>C-shape, terrace, walls</u>
<u>50-10-31-23942</u>	<u>Cairn</u>	-
<u>50-10-31-23943</u>	<u>'A'a pit complex</u>	<u>'A'a pits</u>
<u>50-10-31-23944</u>	<u>Rockshelter</u>	<u>Rockshelter, work area, enclosure</u>
<u>50-10-31-23945</u>	<u>Modified sink</u>	<u>Lava tubes, mounded wall</u>
<u>50-10-31-23946</u>	<u>Enclosure</u>	-
<u>50-10-31-23947</u>	<u>Rockshelter</u>	-
<u>50-10-31-23948</u>	<u>Multi-use complex</u>	<u>'A'a pits, alignments, mound, lithic scatter</u>
<u>50-10-31-23949</u>	<u>Limited-use hab complex</u>	<u>Enclosure, modified outcrop</u>
<u>50-10-31-23950</u>	<u>Mound</u>	-
<u>50-10-31-23951</u>	<u>Lava tube</u>	-
<u>50-10-31-23952</u>	<u>'A'a pit complex</u>	<u>'A'a pits</u>
<u>50-10-31-23953</u>	<u>Limited-use hab complex</u>	<u>Lava tube, wall</u>
<u>50-10-31-23954</u>	<u>Lithic scatter</u>	-

#### **Known Areas of Traditional Importance**

As discussed above, Social Research Pacific (SRP) is conducting an oral history survey of PTA to define and locate TCPs, as defined in Section 3.11.2, and other ATIs at PTA. None of the potential ATIs identified in the draft report (SRP 2002) fall within the areas of the Proposed Action. The Ahu a 'Umi heiau is constructed on the plain on the interior slope of Mount Hualalai, well outside of the SBCT project area, although trails that cross PTA lead to this area. A major battle was said to have occurred in the plain, with the result determining

Table 8-29  
WPAA Archaeological Sites

Site No.	Site Name/Type	Probable Function	Probable Age
50-10-21-20852	Unknown	Ranching	Historic
50-10-21-20854	2 enclosures and trash scatter	Habitation animal pen	Historic
50-10-33-20855	Road, "waimea-kona belt road"	Transportation	Historic
50-10-21-21132	Unknown	Possible burial	Unknown
1522-102	Unknown	Quarry	Unknown
1522-105	Unknown	Ranching	Historic
20854	C-shape complex	Habitation	Historic
22929	Terrace-enclosure complex	Temporary habitation/agriculture	Historic?
22933	Rock shelter	Temporary habitation	Pre-Contact/historic
23467	Enclosure	Agriculture	Undetermined
23468	Mound	Possible burial	Undetermined
23469	Mound-cairn-wall complex	Undetermined/marker	Undetermined
23470	Cairn	Marker	Undetermined
23471	Cairn	Marker	Undetermined
23472	Cairn	Marker	Undetermined
23473	Mound complex	Undetermined	Undetermined
23486	Wall	Agriculture	Undetermined
23487	Enclosure/excavated pit	Agriculture	Undetermined
23488	Mound	Agriculture/land clearing	Undetermined
23489	Mound	Ranching/land clearing	Post-Contact
23490	Enclosure	Ranching	Post-Contact
23491	Mound	Ranching/land clearing	Post-Contact
23492	Wall section	Boundary remnant	Post-Contact
23493	Mound	Ranching/land clearing	Post-Contact
23494	Cairn	Marker-painted white	Modern
23495	Wall-mound-terrace complex	Temporary habitation/agriculture	Post-Contact?
23496	Platform	Habitation?	Undetermined
23497	Enclosure-C-shape-wall complex	Possible habitation	Pre-Contact
23498	Cairn	Survey marker	Post-Contact
23499	Enclosure-concrete basin	Cistern	Post-Contact
23500	Parallel walls	Possible cattle chute	Post-Contact
23501	Petroglyph	Rock art	Pre-Contact
23502	Cairn	Marker	Undetermined
23503	Cairn	Marker	Undetermined
23504	Cairn	Marker	Undetermined
23505	Enclosure-platform	Possible burial	Pre/post-Contact
23506	Wall	Possible cattle chute	Post-Contact
23507	Rock shelter	Temporary habitation	Pre-Contact
23508	Terrace	Agriculture?	Undetermined
23509	Mound complex (20+)	Quarry material?	Post-Contact
23510	Mound (on Pu'u Iwa'iwa)	Survey marker	Post-Contact
23511	C-shape	Temporary habitation	Pre-Contact
23512	Enclosure	Permanent habitation (near old Mama road)	Post-Contact

**Table 8-29**  
**Archaeological Sites (continued)**

Site No.	Site Name/Type	Probable Function	Probable Age
23513	Cairn	Survey marker?	Modern?
23514	Cairn	Survey marker?	Modern?
23515	C-shape	Temporary habitation	Post-Contact
23516	Retaining wall	Road bed-Ke'amuku Station	Historic
23517	Enclosure, mound, burial	Military training/cremation burial	Multiple
<u>23518</u>	<u>Retaining wall</u>	<u>Ranch road</u>	<u>Historic</u>
23519	Wall-enclosure	Boundary/habitation	Historic
23520	Mounds complex	Land clearing	Post-Contact
23521	Mounds	Land clearing/quarrying	Post-Contact
23522	Mound complex	Land clearing	Post-Contact
23523	Terrace	Land clearing	Post-Contact
23524	Cairn	Marker	Post-Contact
23525	Mound	Marker	Historic/modern
23526	Enclosure remnant	Ranching/quarrying?	Historic
23527	Pictograph	Rock art	Pre/post-Contact
23528	Cairn	Marker	Historic/modern
23529	Cairn	Ahupua'a boundary marker	Historic
23530	Cairn	Ahupua'a boundary marker	Historic
23531	Cairn	Ahupua'a boundary marker	Historic
23532	Cairn	Ahupua'a boundary marker	Historic
23533	Cairn	Marker	Historic/modern
23534	Mound	Marker	Historic/modern
23536	Mound	Ahupua'a boundary marker	Historic
23537	Mound	Ahupua'a boundary marker	Historic
23538	Mound	Marker/land clearing	Historic/modern
23539	Ke'amuku Village complex	Sheep-cattle station; permanent habitation; animal pens; possible burial.	Historic
23540	Retaining wall	Possible historic road section.	Historic
23541	Enclosure complex	Sheep farming	Historic
23542	C-shape	Temporary habitation/hunting?	Historic
23543	Mound complex	Land clearing/road material?	Historic
23574	Mound	Land clearing/marker?	Historic
23575	Mound complex	Land clearing/road material?	Historic
23576	Concrete structure	Foundation	Historic
23577	Mound complex	Land clearing/road material?	Historic
23578	Retaining wall	Possible road	Historic
23579	Mound-terrace-enclosure complex	Temporary habitation; agriculture?	Historic
23580	Mound	Land clearing/road material?	Historic
23581	Mound-mod. Outcrop complex	Land clearing/road material?	Historic
23582	Mound	Land clearing/road material?	Historic
23583	Mound complex	Land clearing/road material?	Historic
23584	Mounds	Land clearing/road material?	Historic
23585	Mound complex	Land clearing/road material?	Historic
23586	Mound complex	Land clearing/road material?	Historic
23587	Mound	Land clearing/road material?	Historic
23588	Faced mound	Marker?	Historic
23589	Mound	Land clearing/road material?	Historic



Table 8-29  
Archaeological Sites (*continued*)

Site No.	Site Name/Type	Probable Function	Probable Age
23590	Mound complex	Land clearing/toad material?	Historic
23591	Lava tube	Temporary habitation; burial	Pre-Contact
23592	Mound	Marker	Historic/modern
23593	Mound complex	Markers	Historic/modern
23594	Mound	Marker/possible temporary habitation	Historic?
23595	Mound complex	Land clearing/road material?	Historic/modern
23596	Mound	Land clearing	Historic/modern
23597	Mound	Land clearing	Historic/modern
23598	Mound complex	Land clearing?	Historic/modern
23599	Mound complex	Quarry piles/ranching?	Historic/modern
23600	Mound	Land clearing	Historic/modern
23620	Mound complex	Land clearing	Historic/modern

Source: IARII 2003, Roberts et al. 2003

how the island would be divided after 'Umiāloa's death. Preliminary work on the ATIs of PTA by SRP reveals that the grandparents of some kūpuna or elders were known to cross the island via 'Umi's Road.

ATIs may include previously identified archaeological sites. Almost all sites at PTA are Native Hawaiian sites and reflect the traditional types of activities that Hawaiians conducted in this region. Activities included procurement of lithic (stone) resources, primary preparation of tools in workshops, hunting of birds, and collection of nestling birds. A few sites incorporate ritual aspects. Streck (1986b) interprets a basalt platform on a terraced mound within a lava tube as a shrine (Site 10269). Shapiro et al. (1995) identify a grouping of rock platforms and open-air sites with stone uprights near Pu'u Koli in the southeastern portion of PTA as a place where prehistoric Hawaiian religious activities took place (Reinman et al. 1998, 17). Ritual permeated traditional Hawaiian life, including everyday work activities, and some of the religious structures at PTA may be occupational shrines, where fowlers, quarry workers, and woodcutters recited formulas and made offerings connected with their work.

Most of the sites in the WPAA are associated with historic era agriculture and ranching activities. Only 10 sites are clearly or possibly of traditional Native Hawaiian origin. These mainly consist of a few agricultural terraces and enclosures and habitation sheltets. A few sites may be of special importance to Native Hawaiians: a basalt ledge with a petroglyph, and a boulder face with an anthropomorphic red pigment pictograph.

### 8.11.2 Environmental Consequences

#### *Summary of Impacts*

Cultural resources impacts related to the Proposed Action at PTA vary depending on the location and nature of the project. There are five significant impacts and two significant and mitigable to less than significant impacts to cultural resources within PTA and the proposed WPAA. Impacts primarily relate to the construction phase and range uses in PTA and the

WPAA. As explained in the mitigation sections below, severity of these impacts would be reduced by compliance with the PA the Army has developed, in consultation with the Hawai'i SHPO, the ACHP, and various Native Hawaiians. The PA is provided in Appendix J.

Mitigation measures for archaeological resources or ATIs will include evaluation for NRHP eligibility and avoidance or data recovery of eligible sites. Impacts on ATIs or TCPs, as defined in Section 3.11.2, will be mitigated through avoidance and monitoring of construction by Native Hawaiian monitors as defined in the PA. Mitigation will be developed in consultation with the SHPO and Native Hawaiians, also in accordance with the provisions of the PA. Documentation of such ongoing consultation is provided in Appendix J.

Four less than significant impacts include the risk to archaeological sites from constructing the FTI, the risk to undiscovered archaeological sites in areas of low potential for subsurface archaeological resource, the risk to historic architecture and landscapes from installation of cables and conduits, and the risk to archaeological sites from troop travel from Kawaihae to PTA. These impacts will be mitigated by complying with the IDP contained in the PA, complying with the Secretary of the Interior's Standards for Rehabilitation of Historic Buildings, and monitoring by installation personnel. Table 8-30 summarizes the potential impacts on cultural resources at PTA.

#### ***Proposed Action (Preferred Alternative)***

##### ***Significant Impacts***

Impact 1: Impacts on historic buildings. Ke'amuku Sheep Station, Site 23539, has eight features, including three habitation foundations and remnants of three outbuildings. There is historic debris, wood from former structures, and chicken coops on or near the features (Roberts et al. 2003, 70-72). These buildings may be put at risk from military use, particularly as a result of training exercises that may result in damage to the buildings. Military training in the new range may result in damage to these historic buildings, and other historic ranching features. Impacts may include damage from vehicles, vandalism or fire, among other possible impacts. A Range Maintenance Facility would be built on the west side of the PTA cantonment area, approximately 300 feet (91.4 meters) north of the main entrance from Saddle Road. The cantonment area contains Quonset huts dating from 1955 to 1958 that have not been evaluated for NRHP eligibility as Cold War era properties. Constructing the Range Maintenance Facility would require demolishing eight of these Cold War era buildings (Building numbers T187, T188, T17, T19, T20, T31, T3, and T2).

The Proposed Action would upgrade the 4,750-foot (1,448-meter) runway at BAAF to accommodate C-130 and C-17 aircraft. BAAF was built in 1956 (Langlas et al. 1997, 50) and is a potential Cold War site.

The mitigation measures below will reduce the severity of the impact but not to less than significant levels.

**Table 8-30**  
**Summary of Potential Cultural Resources Impacts at PTA**

Impact Issues	Proposed Action	Reduced Land Acquisition	No Action
Impacts on historic buildings	⊗	⊗	○
Impacts on archaeological resources from range and facility construction	⊗	⊗	○
Impacts on archaeological resources from training activities	⊗	⊗	○
Impacts on ATIs	⊗	⊗	○
Impact on archaeological resources from construction of FTI	⊙	⊙	○
Impacts from installation information infrastructure architecture construction	⊙	⊙	○
Impacts on archaeological sites from road construction	⊗	⊗	○
Impacts on archaeological sites from road use	⊙	⊙	○
Impacts on archaeological sites from construction of the ammunition storage facility.	⊙	⊙	○

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

\* Impacts may be mitigable to less than significant.

**LEGEND:**

- |  |                       |
|--|-----------------------|
| ⊗ = Significant  | + = Beneficial impact |
| ⊙ = Significant but mitigable to less than significant | N/A = Not applicable  |
| ⊙ = Less than significant                              |                       |
| ○ = No impact  |                       |

Regulatory and Administrative Mitigation 1. The Army will require WPAA buildings to be avoided by using range management protocols, which will require the area around the buildings to be off-limits to military training activities. Ke'amuku Village will be marked as off-limits for training to protect it from damage.

The Army will continue consulting with the SHPO, ACHP, and interested parties in accordance with Section 106 of the NHPA on the proposed PTA master plan to include the preservation and protection of historic buildings in the PTA cantonment area.

Impact 2: Impacts on archaeological resources from range and facility construction. The AALFTR is to be built on Range 3 and Range 8, extending into the ordnance impact area and along the west side of Redleg Trail. The ordnance impact area has UXO and restricted access. The northern BAX parcel extends into the ordnance impact area and north of the trail. There would be no increased impacts on archaeological resources in the ordnance impact area as a result of the Proposed Action.